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THE

EDINBURGH
MEDICAL AND SURGICAL
JOURNAL:

EXHIBITING

A CONCISE VIEW

OF THE

LATEST AND MOST IMPORTANT DISCOVERIES

IN

MEDICINE, SURGERY, AND
PHARMACY.

VOLUME SEVENTY-FOURTH.

1850.

EDINBURGH:
PRINTED FOR ADAM AND CHARLES BLACK;
LONGMAN, BROWN, GREEN, & LONGMANS, LONDON;
AND HODGES & SMITH, DUBLIN.

1850.

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ROBERT INCHES, PRINTER, OLD ASSEMBLY CLOSE, EDINBURGH.

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Communications have been received from Dr C. RITCHIE, Mr NICHOLL, Mr E. MILNER, Dr HÉGELE, and MM. PALM and ENKE.

The following Publications have been received:—

On the Theory and Practice of Midwifery. By Fleetwood Churchill, M. D., M. R. I. A., Hon. Fellow of the Royal College of Physicians in Ireland, &c. Illustrated by upwards of one hundred highly finished Wood Engravings. Second Edition, Corrected and Improved. London, 1850. 12mo. Pp. 496.

On Diseases of Menstruation and Ovarian Inflammation, in Connection with Sterility, Pelvic Tumours, and Affections of the Womb. By Edward John Tilt, M. D., Physician to the Farringdon General Dispensary, and to the Paddington Free Dispensary for the Diseases of Women and Children. London, 1850. Post 8vo. Pp. 250.

On the Causes, Nature, and Treatment of Palsy and Apoplexy. Of the Forms, Seats, Complications and Morbid Relations of Paralytic and Apoplectic Diseases. By James Copland, M. D., F. R. S., Fellow of the Royal College of Physicians, &c. &c. London, 1850. Post 8vo. Pp. 414.

A Manual of Elementary Chemistry, Theoretical and Practical. By George Fownes, F. R. S., Professor of Practical Chemistry in University College, London. With numerous Wood Engravings. Third Edition. London, 1850. 12mo. Pp. 605.

A Practical Handbook of Medical Chemistry. By John E. Bowman, Fellow of the Chemical Society, and Demonstrator of Chemistry in King's College, London. London, 1850. 12mo. Pp. 259.

The Causes, Symptoms, and Treatment of Eccentric Nervous Affections. By William John Anderson, F. R. C. S. London, 1850. Post 8vo. Pp. 199.

The Unity of Nature. By Charles Bland Radcliffe, M. B., Licentiate of the Royal College of Physicians, Lecturer on Vegetable Physiology and Botany at the Westminster Hospital. London, 1850. 8vo. Pp. 150.

A Physician's Holiday, or a Month in Switzerland in the Summer of 1848. By John Forbes, M. D., F. R. S. Physician to Her Majesty's Household. With a Map and Illustrations. Second Edition, Revised and Corrected. London, 1850. Post 8vo. Pp. 350.

On the Principles of Health and Disease. An Inaugural Dissertation of the University of Edinburgh. By David Nelson, M. D., Edinburgh. Physician to the Queen's Hospital, and Professor of Clinical Medicine in Queen's College, Birmingham, &c. &c. London, 1850. 8vo. Pp. 113.

The Symptomatic Treatment of Cholera. By Ewing Whittle, M. D. London, M. R. C. S. Honorary Surgeon to the Liverpool South Dispensary, and Surgeon to the Toxteth Park Cholera Hospital in 1849. London, 1850. 12mo. Pp. 100.

Du Mode d' Action, des Eaux Minerales de Vichy, et de leurs Applications Therapeutiques, Particulierement dans les Affections Chroniques des Organes Abdominaux, La Gravelle et les Calculs Urinaires, La Goutte, et le Diabete Sucré; Par Charles Petit, D. M., Membre de la Soc. de Med. de Paris, et Medecin-Inspecteur-Adjoint des Eaux de Vichy. A Paris, 1850 8vo. Pp. 504.

A Practical Treatise on Diseases affecting the Skin. By the late Anthony Todd Thomson, M.D., F.L.S., Fellow of the Royal College of Physicians; Professor of Materia Medica and of Medical Jurisprudence in University College, and Physician to University College Hospital. Completed and edited by Edmund A. Parkes, M.D., Member of the Royal College of Physicians; Professor of Clinical Medicine in University College, and Physician to University College Hospital. London, 1850. 8vo. Pp. 440.

Pathological and Surgical Observations on the Diseases of the Joints. By Benjamin C. Brodie, Bart., V.P.R.S., Serjeant-Surgeon to the Queen;

Surgeon to his Royal Highness Prince Albert; formerly Surgeon to St George's Hospital, &c. Fifth Edition, with Alterations and Additions. London, 1850. 8vo. Pp. 399.

Some Remarks on the Contamination of Water, by the Poison of Lead, and its Effects on the Human Body. By James Bower Harrison, M.R.C.S.I. London, 1850. 12mo. Pp. 32.

The Sumbul: a New Asiatic Remedy of Great Power against Nervous Disorders, Spasms of the Stomach, Cramp, Hysterical Affections, Paralysis of the Limbs, and Epilepsy, and in the Collapse Stages of Cholera, &c. By A. B. Granville, M.D., F.R.S., of the Royal College of Physicians, London, &c. &c. London, 1850. 12mo. Pp. 40.

On the Nature and Cure of Consumption, Indigestion, Scrofula, and Nervous Affections. By G. Calvert Holland, M.D., lately Physician to the Sheffield General Infirmary, &c London, 1850. 8vo. Pp. 205.

The Types of Delirium Tremens, their Pathology and Treatment. By James Bird, A.M., M.D. London, 1850. 8vo. Pp. 29.

The Fifth Fasciculus of Anatomical Drawings, selected from the Collection of Morbid Anatomy in the Army Medical Museum at Chatham. Drawn on Stone by George H. Ford. London, 1850. Folio. Eighteen Engravings.

The Pathology of the Human Eye. By John Dalrymple, F. R. C. S. Fasciculus IV. Folio. London, 1849. Fasciculus III. not received.

Surgical Anatomy. By John Maclise, Surgeon. London, 1850. Folio. Fasciculus V. Fasciculus IV. not received.

Mesmerism tried by the Touchstone of Truth. Being a Reply to Dr Ashburner's Remarks on Phrenology, Mesmerism, and Clairvoyance. By George Corfe, of Middlesex Hospital. London, 1848. 8vo. Pp. 48.

Pathological Researches on Death from Suffocation and from Syncope, and on Vital and *Post Mortem* Burning, Suggested by the Case of the Alleged Bridgenorth Matricide. By Samuel Wright, M. D., LL. D., D. C. L., Professor of Clinical Medicine in Queen's College, Birmingham, &c. &c. With Plates. London and Birmingham, 1850. 4to. Pp. 34.

Is the Practice of Medicine in 1850 a Degenerate Pursuit? By a Practitioner. Second Edition. London, 1850. 8vo. Pp. 24.

The Chrono-Thermalist, or People's Medical Inquirer. April 1850. No. ii. London. 8vo.

Memoir on the Influence of Hypertrophy and Dilatation in Diseases of the Heart, and on some points in their Diagnosis and Treatment. By A. Halliday Douglas, M.D., F. R. C. Phys. Edin.; Physician to the Royal Infirmary, &c. Edinburgh, 1850. 8vo. Pp. 49.

The Half-Yearly Abstract of the Medical Sciences. Edited by W. H. Ranking, M. D,, Cantab., late Physician to the Suffolk General Hospital. Volume X. July—December 1849. London, 1850. 8vo. Pp. 387.

The London Medical Gazette; or Journal of Practical Medicine. No. 1164, New Series, 256, 22d March 1850; to No. 1176, New Series, 14th June 1850.

The London Journal of Medicine. No. 16, April; No. 17, May; No. 18 June 1850.

The Dublin Quarterly Journal of Medical Science. No. xviii, May 1850.

Weekly Tables of Mortality for the Metropolis. No. 12, 23d March 1850 No. 24, Saturday, June 15th 1850.

The American Journal of the Medical Sciences. Edited by Isaac Hays, M.D. No. 38. New Series, April 1850.

The Quarterly Medical Recorder; being a Digest of the Progress o Practical Medicine, Surgery, Obstetrics, Medical Jurisprudence, and Pharmacy. Part I., Vol. I., February to May 1850.

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ERRATA.

Page 49, line 17 from bottom, *for* affections, *read* effusions.
„ 50, „ 22 *for* either, *read* other.
„ 397, „ 20 from foot, *for* magical, *read* logical.
„ 419, in last line, *after* readers, *insert* is.
„ 420, 3d line from foot, *for* "as good as," *read* "as good in."

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Communications have been received from Dr Ritchie, Mr Brown,
Dr Battersby, and Mr Wilkins.

The following Publications have been received :—

The Diseases of the Breast and their Treatment. By John Birkett,
Fellow of the Royal College of Surgeons, England, F. L. Society, and
Assistant-Surgeon to Guy's Hospital. (The Dissertation to which the
Jacksonian Prize for 1848 was awarded by the Council of the R. C. S. E.)
London, 1850. 8vo. Pp. 264. Ten Lithograph Plates.

Treatise on the Diseases of the Larynx and Trachea: embracing the
Different Forms of Laryngitis, Hay Fever, and Laryngismus Stridulus.
By John Hastings, M.D., Edinburgh, Lic. R.C. Physicians, London; Phy-
ician to the Dispensary for Consumption and Diseases of the Chest.
London, 1850. 8vo. Pp. 160.

Gout; its Causes, Cure, and Prevention, by an original and most success-
l treatment, founded on the Organic Changes in the Human Solids, and
n the Functions of the Skin, without the use of Colchicum. By Abraham
ealmin, M.D., Member of the R. C. Surgeons, England, &c. London,
850. 12mo. Pp. 112.

Cases illustrative of the Cure of Consumption and Indigestion. By G.
alvert Holland, M.D., lately Physician to the Sheffield General Infir-
ary, &c. London, 1850. 12mo. Pp. 104.

A Theoretical and Practical Treatise on Human Parturition. By H.
iller, M.D., Professor of Obstetrics and the Diseases of Women and
hildren in the Medical Department of the University of Louisville.
ouisville and London, 1850. 8vo. Pp. 463.

The Anatomy, Physiology, and Pathology of the Eye. By Henry Hav-
d, M.R.C.S.L., Surgeon to the Montreal Eye and Ear Institution.
ontreal and London, 1850. 8vo. Pp. 514.

The Baths of Rhenish Germany; with Notices of the adjacent Towns.
y Edwin Lee, Corresponding and Honorary Member of the Imperial
edical Academy of Vienna, the Royal Academy of Medicine at Naples,
c. London, 1850. 12mo. Pp. 133.

The Principles of Surgery. By James Miller, F. R. S. E., F. R. C. S. E.,
rofessor of Surgery in the University of Edinburgh, Senior Surgeon to
e Royal Infirmary, &c. &c. Second Edition. Illustrated by 238 En-
ravings on Wood. Edinburgh, 1850. 8vo. Pp. 803.

Practical Suggestions for the Prevention of Consumption. By G. Cal-
rt Holland, M. D., lately Physician to the Sheffield General Infirmary,
c. London, 1850. Pp. 143.

Cholera and its Cures: an Historical Sketch. By J. Stevenson Bush-
an, M. D., M. R. C. S., and Fellow of the Royal College of Physi-
ans of Edinburgh. London, 1850. 8vo. Pp. 169.

Report of the General Board of Health on the Epidemic Cholera of
48 and 1849. Presented to both Houses of Parliament by command of
er Majesty. London, 1850. 8vo. Pp. 157.

Corpulence, or the Excess of Fat in the Human Body: its relations to
hemistry and Physiology, its bearings on other Diseases, and the Value
Human Life, and its Indications of Treatment, with an Appendix on
maciation. By Thomas King Chambers, D. M., Fellow of the R. Col-
ge of Physicians, and Gulstonian Lecturer for 1850. 12mo. Pp. 166.

respectively deranged in their functions and organic constitution by various primary alterations of structure in the endocardial portions of the systemic heart and great arteries.

In arranging the illustrations of the latter class, it was thought most expedient to do so according as the greater and more advanced anatomical alterations were observable in the aorta, the aortic valves, the mitral, the aortic and mitral conjoined, the mitral and aortic, or the aortic, mitral, and tricuspid valves. And in terminating these illustrations, the two first series having been disposed of in last paper, it is proposed in the present to consider those which remain.

3d Series. Chief or primary disease situated in mitral orifice.

Case 27.—*Probable chronic albuminuria after pregnancy; warty and cartilaginous occlusion of mitral orifice.*

Mrs Gullan, aged 36, admitted 4th November 1847. This woman is a drinker. After last pregnancy, three years since, the feet and legs became œdematous, and swelling had continued to come and go till two months ago, when it increased and extended to belly, accompanied by vomiting of blood, some cough, and bloody expectoration. Has had occasional palpitation since commencement of illness, and has of late been much troubled with dyspnœa, vertigo, and *muscæ volitantes*. There is extensive cardiac dulness, and a rough rubbing-like sound, continuous or merged below, and double above the left nipple and in the neck. Bronchitic rhonchi of various kinds are recognised in lungs.

She was found dead in bed on the 8th November.

Inspection.—Body very anasarcous. Face swollen, and lips livid. Large sigillations over arms and sides. The pleural and peritoneal cavities were filled with serum. The lungs were much collapsed; the bronchial lining deeply congested, and also thickened.

The heart was agglutinated to the pericardium at various points by recently effused lymph, and over other points by delicate bands of longer standing. The organ was enlarged uniformly nearly two-thirds. The right auricle, ventricle, and pulmonary artery were enlarged, flaccid, and pressing on root of aorta, to which the auricle was connected for about one inch by delicate adhesions. The tricuspid valve slightly thickened. The foramen permitted the passage of three fingers. The pulmonary artery allowed two fingers to lye parallel within its orifice, while that of aorta allowed only the easy passage of the middle finger. The left auriculo-ventricular opening was found completely shut by consistent cauliflower-like vegetations, on removing which, the tip of the little finger only could be put into the opening, narrowed as it was by cartilaginous structure. The portion of the

THE

EDINBURGH

MEDICAL AND SURGICAL JOURNAL.

1st JULY 1850.

PART I.

ORIGINAL COMMUNICATIONS.

Art. I.—*Clinical Contributions to the Pathology, Diagnosis, and Treatment of certain Chronic Diseases of the Heart.* By Charles Ritchie, M.D., late Senior Physician to the Royal Infirmary, Glasgow. (Continued from Volume lxxiii., page 312.)

II. *Of Sinistral, Structural, or Endocardial Disease of the Heart.*

In the preceding parts of these contributions, certain chronic lesions of the heart, constituting the greater portion of the affections of this organ met with in practice, have been considered under the two general divisions of those in which the right side of the organ is primarily, and the left secondarily, the seat of the disease; and of those, again, in which the systemic portion of the heart is the origin and centre of the succeeding changes on itself, —on the pulmonary side of the organ, and on the other viscera.

It was attempted to be shown that the initial lesions in the first class consisted in certain alterations of capacity in the pulmonary vessels, by which their efferent or conducting power was impaired, and habitual regurgitation on the right ventricle established; and that in the second class, or that now under immediate consideration, the left heart, and successively the pulmonary circulation, right heart, and general venous system, become cing to swell, which swelling soon passed upwards till at present it involves both legs and thighs, which are greatly increased in size and pit on pressure. The abdomen also is tumid and fluctuant on percussion. The liver is much enlarged, stretching towards the umbilicus, and rather more to the left side than usual. The patient complains of pain on percussion, over both hypochondriac regions, and over epigastrium, and of some slight pain there on inspiring. She states that, when swelling commenced, she had some haematemesis. She had some pain on coughing at lower end of the sternum, and between shoulders, on both which places she was blistered with benefit.

At present she complains most of the dyspnœa, which causes her to sit up in bed, and prevents her from laying her head low at night.

The patient has a hard dry cough, with some slight bronchitic expectoration. Percussion over chest is clear; very loud, sonorous, and sibilant rhonchi are audible over chest, with here and there a few submucous rattles intermingled. Respiration is loud and bronchial.

Impulse of heart felt strongly about two inches below left nipple. First and second sounds continuous, but neither accompanied by a murmur; both are very loud and ringing in character. Some approach to a bellows murmur heard in direction of aorta.

Appetite middling; bowels open; tongue clean. Catamenia have not appeared; urine slightly albuminous.

Take of sesquicarbonate of potash, two ounces; tincture of squill, two drachms; wine of ipecacuan, one drachm and a half; water, twenty-four ounces; nitric acid sufficient to acidulate the mixture. Half an ounce to be taken well diluted every two hours.

17*th*, Smart pain in right hypochondrium. About six stools daily.

Blood to be drawn by cupping from situation of pain to four ounces, and the part afterwards covered with a fomentation. To have the third part of a calomel and opium pill every three hours.

18*th*, Countenance much flushed; inspirations 52; pulse at wrist 120, and weak. Precordial dulness extends from dextral edge of sternum to beneath nipple, in which latter place the cardiac impulse is very conspicuous over a large area, and is accompanied by purring thrill, sensible to the hand; heart sounds are natural, but extremely loud; violent pulsation of carotids, and some distension of jugular veins. Perspires much. Pulse at heart 140. Present symptoms said to have commenced with application of warm fomentations. Slight dulness and some pain, with pleuritic friction sound under pectoral edge of left mamma.

Repeat the cupping from the cardiac region to four ounces; omit the solution and pills, and let her have half a grain of

calomel every hour. To have the thighs rubbed with a couple of drachms of strong mercurial ointment every six hours.

19th, Pulse 116; impulse of heart visible from third to sixth rib; purring thrill continues.

Heart sounds without murmur; dyspnœa less; œdema of hands. Omit the medicines in present use. Hospital diuretic powder, one drachm; calomel, twelve grains; ipecacuan, four grains; precipitated chalk, one drachm; mix, and form into twelve papers, one to be taken every four hours.

20th, Pulse 108; appearance much improved; inspirations 32; a slight rasping sound in systole is heard under nipple; purring continues in this situation; heart sounds in neck natural; complains only to-day of pain in region of right kidney; over aortic valves second sound predominates; under left pectoral muscle the systolic sound is loud and prolonged; continue.

21st, A friction sound is heard over all the large blood-vessels, but it is slight and suppressed.

22d, She doses a great deal sitting upright in bed; face anæmic, and lips pale; much mucous effusion into bronchia, and frequent long catching expirations; pulse at precordia 96, regular, and without murmur; first sound preponderates; second extremely short, and scarcely perceptible. Pulse at wrist gone; can still swallow. To have ardent spirits as she may require.

Died one hour after visit.

Inspection.—Upper parts of thorax extremely sonorous; lower parts dull. On opening thorax about sixty-four ounces of bloody serum were found effused within pleuræ. The left lung driven into supra-mammary and scapular region by enlarged heart, and right lung had also receded far back; the anterior and lower portion of the cavity being occupied by thick highly organised walls of lymph.

The external surface of the pericardium was very fleshy in its appearance, from great vascularity and deposition of organised lymph. The bag of the heart contained seven ounces of straw-coloured serum. The heart lay transversely, the septum at a very oblique angle with the horizon, and the long axis *in situ* was five inches and three quarters, the short being four. The veins of the heart were much distended, and on right auricle lay some lymph of recent formation. A dense fibrinous clot of a yellow colour, weighing two ounces and a quarter, and being an accurate cast of the cavity and its adjacent vessels, filled the right auricle. The heart weighed fourteen ounces.

The external surface of the pulmonary artery, and also that of the aorta, were very much covered by a tissue of injected vessels, which at sinistral edge of the last named vessel was converted into a fleshy bed of about one-fourth of an inch broad, one inch and a half long, and one-eighth of an inch deep; the wall of the vessel in this situation being depressed into a hollow of the latter depth, which was occupied accurately by the appendix of the left auricle. The opposite side of the pulmonary artery was covered by the corresponding *appendix auriculæ*, and there was some thickening of the cellular coat. Externally the right ventricle appeared thicker, more massive, persistent, and prominent than the left; an appearance which seemed to be produced by the septum in a state of hypertrophy, and which projected considerably on the line of the pulmonary artery. All around the division between the left auricle and ventricle there was a ribbon of very vascular tissue of about three-fourths of an inch in breadth.

The right auricle, when distended, measured three inches and three-quarters; the tricuspid opening when stretched, one and a quarter; that of pulmonary artery at orifice, when stretched, one inch; long diameter of right ventricular cavity, two inches and one-eighth; thickness of its walls, half an inch. Long diameter of left ventricular cavity, three inches and one-eighth; of left auricle, three inches and a quarter; and long diameter, when stretched, was only three-eighths of an inch. Thickness of left ventricular walls half an inch, and their structure soft; thickness of septum, five-eighths of an inch. Long diameter of aortic orifice, when fully stretched, seven-eighths of an inch. The membranous portions of the tricuspid valve were slightly opaque, and here and there a cartilaginous point was perceptible. The inner or auricular surface of the meatus, and of the auricle generally, was of a dusky white colour; and the highly injected ribbon-shaped tissue, which extended from the root of the *appendix auriculæ* of the left side, to the nearest part of the right auricle, was found to form an additional covering to a large coronary vein which opened into the right auricle by a sinus of about one-fourth of an inch across.

The endocardium of the right ventricle around its opening at the pulmonary artery was white, in one or two patches; and here the walls of the ventricle, as well as those of the artery, were thin. The natural openings on the inner surface of the ventricle were converted into distinct canals, and pouches running various distances into the thickness of its parietes, and several, one especially of about two inches in length, terminated at the very surface immediately under the *tunica propria* of the heart. Several of these sinuses penetrated into the septum, and ran along the anterior portion of nearly its whole length. That structure in this situation was more than one inch in thickness, and tapered like a wedge as it proceeded backward.

The inner surface of the pulmonary artery, and of its larger branches, was sprinkled with vascular, slightly-elevated patches, some of which were the size of a split pea, and others more diffused; and this appearance increased very remarkably towards the branches, and as the artery receded from the ventricle.

The inner surface of the left ventricle was whitish and thickened, particularly towards the aorta, the orifice of which and valves were healthy. The membranous portions of the mitral valve were thickened and gathered into a short conical canal, the auricular end of which would not admit more than the tip of the finger, and which terminated in the ventricle by two openings, one at its extremity pointing towards the bottom of the ventricle, which would admit a crow quill, and the other pointing towards the aortic orifice, about a half smaller. On careful inspection, the serous coat of the aorta, especially at its root, was found thickened, and a groove in the situation of the superincumbent pulmonary artery was perceptible on its anterior wall. The inner surface of the left auricle in general was thickened and opaque, and easily separable; but at particular places, and especially at the entrance of the veins, the inner surfaces of the larger of which in particular were pervaded by reddish slight elevations, the auricular endocardium was raised into elliptical shaped wheals, of the size of a split horse-bean. Between the auricles the walls were diaphanous, and in two points thinned to a pellicle. At another part, where the serous lining of the auricle was more than usually shrivelled, loose, and changed in colour and thickness, a thin plate of bone of the size of a barleycorn was noticed.

The right lung weighed one pound and a half, the left one and a quarter.

In tracing the ramifications of the pulmonary artery, several of its branches, especially in the right lung, were found to be pretty deeply red-coloured; in some of the larger branches the inner membrane was thickened pretty generally, and slightly shrivelled as in some portions of left auricle; but, interspersed throughout the diffuse redness, there were in several places highly vascular elevations of the inner membrane, some of them having a vesicular appearance, but extremely minute; and in others, were numerous atheromatous depositions of about the size of a split mustard seed, and some of them considerably larger.

The whole of the external surface of right lung was coated by a well-organised deposit of lymph. The upper lobe of the lung was slightly emphysematous, and of a colour paler than natural. The posterior portion of the lower lobe was much congested, and in some parts hepatized; the bronchial lining was thickened and highly congested; the long fibres of the tubes were considerably hypertrophied. The left lung also was congested; the posterior parts of its middle and lower lobes hepatized. The bronchi of both lungs contained a large quantity of frothy serum.

The liver weighed five pounds and a quarter, and was much increased in size; its upper surface was strongly adherent to the diaphragm by a thick layer of lymph; the structure was dense. The spleen weighed six ounces.

The right and left kidneys weighed five and six ounces respectively, and the renal tissue was much congested, but bore no evidence of degeneration.

Case 30.—*Pain in right hypochondrium, cough, and delicate health after birth of a still-born child; aggravation of these symptoms and dropsy of four weeks' standing; death; mitral orifice a bony slit of a line in breadth.*

Mrs Wilson, aged 30, a washerwoman, 26th October 1838.

This female has been in a delicate state of health since giving birth to a still-born child about eighteen months ago, having been much afflicted with pain in the right hypochondrium and by cough. About four weeks since, the symptoms became unusually severe, and the lower extremities began to swell. They are now highly œdematous, being three or four times their natural size, pit deeply, and are very painful on pressure. The abdomen is very large, and fluctuates distinctly. Pressure over the liver gives great pain, and the viscus is felt through the effused fluid, hard, enlarged, and moveable. The urine is very scanty and high coloured. The patient has frequent nausea and vomiting, with considerable epigastric tenderness. She is in a state of extreme exhaustion, and complains much of pain over the right short ribs, impeding full inspiration, and much increased by cough. The latter is very troublesome, and accompanied with thin bloody expectoration. Her breathing is hurried and laborious, and she usually occupies the semi-bent posture; sleeps little; appetite gone; countenance pale and sallow; tongue brownish; bowels slow; pulse small and rapid; percussion pretty equable over anterior part of chest, but duller than natural. Over both sides loud sonorous rattles are heard intermingled with an occasional sibilus. Slight dulness posteriorly over the lower part of right lung, where some small crepitation is audible; heart's impulse rather stronger, and sounds somewhat rougher than natural.

To have six ounces of wine gradually.

Death took place on the 27th.

Inspection thirty-four hours after death.

Head not opened.

Thorax.—Turbid serum, to the amount of several ounces, in the pleuræ on both sides. There was also some in the pericardium.

The heart was dilated, but of natural thickness, full of bloody coagula. All the valves were healthy except the mitral; this was completely ossified, the opening reduced to a fissure about one inch long by a line broad. Half of this fissure was bounded by firm bone, the other half by thickened and cartilaginous substance; both sides were perfectly immoveable. Towards the ventricle, it was quite smooth, but on the side of the auricle the bony mass was rough.

Both lungs were partially adherent to walls of chest. The bronchi were reddish, and gorged with mucus. The left lung engorged, but otherwise healthy. The right healthy anteriorly and at summit. The lower lobe quite consolidated behind; on cutting into it, it was found of a dark red colour, firm, not crepitating, slightly granular and much engorged. Some portions, of about the size of walnuts, were much harder, of a deep black colour, and more distinctly granular.

Abdomen.—The spleen was small, of a dark red colour, and pretty firm.

The liver of rather larger size, somewhat uneven on the surface and very granular; though the granulations were smaller, yet, from the deep, but partial, and confused lobular congestion, the viscus had a highly mottled appearance. Its veins were healthy. Bile scanty, thin, and of a brown colour; pancreas natural.

The kidneys were healthy, as also uterus and appendages.

The stomach of natural appearance, except that the mucous membrane was soft, and faintly follicular; a good deal of congestion in various parts of the small intestine, but, as it seemed, chiefly from position.

Case 31.—*Chronic palpitation, sudden increase with dyspnœa, intermitting pulse, cough, and dropsy; mitral orifice obstructed by ossification.*

Hugh Bradly, aged 40, 26th July.

This man has had for a number of years palpitation of the heart, which has of late become very troublesome, forbidding almost any exertion, and accompanied by great dyspnœa. On Friday last the feet began to swell slightly, in which state they at present continue. He complains of pain in ankle and knee joints, and especially in hip joints, and over great sciatic nerves. Complains of some pain in region of heart, stretching into left shoulder. He says that the palpitation is most troublesome in the epigastrium, and complains of pain there on pressure, and along course of abdominal aorta. Cough began a fortnight ago with expectoration of yellow mucus. Has no appetite, sleeps little; tongue furred, of a whitish brown; bowels costive; pulse 70, weak, and intermittent. Percussion good; sonorous rhonchi heard. Distinct bellows murmur accompanies heart's action. Urine reddens litmus paper, and deposits a brownish sediment. No deposit is thrown down by heat or nitric acid.

A blister to be applied over the region of the heart; to have the foot bath, and half an ounce of whisky every four hours.

Died on 29th.

Inspection.—*Head* not examined.

Thorax.—The lungs were very emphysematous, and some portions were hepatized. They contained some frothy serum. The bronchi were considerably reddened. Some fluid was effused into both pleural cavities. The pericardium was distended with clear yellowish fluid.

The heart was somewhat hypertrophied, and in left ventricle was found a very large polypus, and also several others of a smaller size in right.

The mitral valve was increased in size and completely ossified, so as much to diminish the auriculo-ventricular opening. In other respects the heart was healthy.

Abdomen.—The liver was somewhat injected; the kidneys tolerably healthy, other viscera healthy.

Case 32.—*Violent symptoms of six months' standing; profuse hæmoptysis; violent palpitation, treated by blood-letting and opium; death from cerebral symptoms. Mitral orifice ossified.*

William Mackechnie, aged 21, baker. 17th March.

Six months ago, this man, after having carried for a mile a heavy load of bread upon his head, felt tired, and set it down, when he instantly discharged by the mouth a considerable quantity of fluid florid blood. The blood flowed into his mouth, with slight tickling in his throat, and occasional cough, which always caused a greater discharge, without any effort at vomiting. He was obliged to carry the basket a quarter of a mile farther, and to return home with it empty. On his way home he was frequently obliged to stop, on account of breathlessness. During the night he coughed up in mouthfuls a great quantity of blood similar to the former. This second hemorrhage lasted four hours, notwithstanding the loss of a considerable quantity of blood by the arm soon after its commencement; and his strength was much reduced. He resumed his work in three days, and continued at it for five weeks; but as any exertion, especially carrying baskets on his head, caused a return of the discharge, he was obliged to desist, and has not since returned to it. At present, when he remains at perfect rest, he feels pretty easy, and has little cough except in the recumbent posture. Any exertion, however, induces much dyspnœa, followed by cough, with bloody expectoration, and violent palpitation. Pulsation of heart stronger and more diffused than natural. The pulse quick, a little hard, but quite regular; cannot lie on back, and lies with most ease on face and right side; always coughs a good deal before falling asleep, but can lie with his head as low as usual when on his face; whereas, some time ago, he was obliged to sit in bed. Never had any pain in breast, and can inspire fully without inconvenience. Breathing is nearly natural. At commencement of complaints he sweated much during night, but not now. Is worst in afternoons; tongue natural; appetite and strength impaired, and dyspnœa worst after meals. Some flatulence; sleeps ill. Has used no remedies.

To be strictly confined to bed, and to have half an ounce of castor oil.

18*th*, Says the palpitation of heart is so severe as to prevent sleep. Pulse about 130, and complains of difficulty of breathing, and increased cough.

To lose blood at arm to eighteen ounces, and to have half an ounce of Epsom salts.

21*st*, Pulse 104; blood not at all buffy; pulsation of heart still very strong; did not get the salts ordered.

Let him have the sulphate of magnesia ordered.

24*th*, Palpitation no better. A blister to breast.

25*th*, Says he thinks he breathes rather easier since blister, but the palpitation is unabated.

April 7th, The pulsation of the heart is still as violent as ever. Pulse 108, and quite regular. Says that at the same time the beating of the breast does not disturb him.

Divide one scruple of opium, and half a drachm of assafœtida into ten pills, of which let the patient have two in the day.

8*th*, Pulsation of heart less violent.

To have three of the pills daily.

9*th*, Says he has rejected pills by vomiting; in other respects nearly as before.

Pills to be omitted, and patient to have three grains of opium at night.

10*th*, Pulsation of the heart continues to be felt, but is rather less violent. Bowels slow.

Bowels to be kept open by a solution of equal portions of sulphate of soda, magnesia, and tartrate of potash, and the opium to be continued.

13*th*, Pulsation of the heart is not quite so violent, and he thinks himself a good deal easier.

To have four grains of opium every night.

22*d*, Pulsation of the heart has continued less violent since last report. Pulse 108. Continue.

27*th*, Palpitation has continued less violent since last report. Has had no night sweats, and his pulse is now reduced to 96. Continue treatment.

May 7th, Palpitation more troublesome these two days, and prevented sleep last night. Pulse a little quick.

To lose blood at arm to ten ounces, and to have a blister applied to the breast.

8*th*, Hitherto little effect from bleeding or blister. Blood not buffy.

9*th*, Some nausea last night and to-day. Omit the opium.

10th, Last night had an emetic, after which he had some sleep. To-day suddenly became delirious, for which eight leeches were applied to head; palpitation much the same. No pain of head.

To have one ounce of Epsom salts, and a blister to be applied to the head.

11th, Delirium continues; much green fluid vomited. Some scanty loose stools with tenesmus. No nausea just now, and had to-day a dose of castor oil, hitherto without operation.

Oil to be repeated if necessary.

12th, Vomited oil, and has had no stool. Frequent vomiting of yellow fluid. Pulse very feeble and quick. Tongue dry, and much thirst. Breathing laborious and frequent, though no pain of breast. Countenance languid. Had an opiate last night, followed by some sleep.

Death took place after the visit.

Inspection.—Mitral valve completely ossified, and passage between auricle and ventricle much diminished. Nothing found to account for acute symptoms previous to death.

Case 33.—*Cartilaginous and bony degeneration of mitral valve of three months' standing on first admission. Diagnosis well indicated by physical signs. Symptoms highly aggravated, but relieved by treatment. Exposure to cold, and accession of aortitis. Great adynamia. Death.*

Isaac Martin, aged 50, a cotton carder, 20th April, 1848. Three months ago this man was exposed to much cold and fatigue, followed by severe cough and copious expectoration. Continued in unestablished health, with cough and weakness, till four weeks ago, when he became affected severely with piles, and in another week with swelling of legs and occasional dyspnœa, particularly on making any effort. A continuous harsh bellows murmur is heard with greatest distinctness along outer edge of left mamma,—less so over the site of the aorta,—and not at all over the course of the carotids. Precordial dulness more considerable and to left than usual; normal impulse gone, and epigastric pulsation pretty strong. Pulse intermits every sixth or eighth beat. Liver slightly enlarged. Urine scanty, and high coloured. Appetite good. Some diarrhœa.

He was cupped over the region of the kidneys to six ounces; and after the removal of the looseness by catechu, he was put on the squill, tartar, and nitre powder, when the patient left the house, and returned on 3d May.

Swelling in legs has increased since his leaving the house, and at present extends to the scrotum. Lower limbs nearly double their size, and very hard. A loud continuous bellows murmur, which is sometimes rasping, continues. It is best heard at apex, then at axilla, and lastly in ascending aorta. Liver is felt enarged and hard. Dyspnœa in horizontal position, or on any motion. Distension of frontal and of ranular, but not of jugular veins. A deep-seated, extended, and irregular cardiac impulse. Pulse 96, and feeble at wrist.

The former internal treatment was resumed, with the addition of a purgative dose of bitartrate of potash every eight hours, which was, however, omitted on the accession of purging on the 5th, when the third part (⅓ gr. of calomel) of a calomel and opium pill was ordered every three hours.

8th, Much exhaustion; pulse at wrist 44, at heart 48, and dicrotous. The extremities livid; mouth sore; four diarrhœal stools.

He was surrounded with jars of hot water, and allowed half an ounce of gin every two hours, the calomel being discontinued. During the following eight days fruitless efforts were made to act on the kidneys by powders of squill and ipecacuana every fourth hour, aided by gin, when on the 17th a quarter of a grain of digitalis was added to each powder, along with camphor mixture, carbonate of ammonia, and tincture of quassia. On the 25th May, the report states, urine seven pounds; pulse 72, and regular; scrotum fallen about a half; legs distended and inflamed. He says that till yesterday any attempt to read was always succeeded by precordial uneasiness. The remedies to be continued."

On the 1st June the powders were stopped, and on the 5th his situation was as follows:—" Pulse 88, regular; anasarca gone, as is also the distension of the frontal veins, and the tumultuary movements of the heart. A continuous bellows sound, but of diminished strength, remains under left nipple; bowels slow."

The gin was continued at half quantity till the 16th, and he was dismissed on the 19th.

Re-admitted 1st July.

About six days ago, after exposure to cold, he had a rigor, which has frequently returned since, but without reaction on any of the occasions. Complains of pain in right anterior thorax, but principally in hypochondriac region, and all his former symptoms have returned. Violent carotid pulsation; heart sounds continuous, irregular, and harsh, all over cardiac region. In mitral region a rough filing sound; and along ascending aorta a loud, rough, irregular, and merged sound is heard; jugular veins rather turgid. Dyspnœa prevents his sleeping or lying in bed. Pulse 100 at wrist.

He was ordered two grains of calomel every two hours, and a grain of squill and a half grain of digitalis, with nitre and bitartrate of potash every six hours. On the following day the appearance of prostration of strength suggested his getting half an ounce of gin every four hours; and on the 3d, pulse at wrist is reported at 120, and small. Cardiac murmurs have disappeared, and sounds are feeble; surface cold. Complains of pain under right scapula.

5th, Pulse perceived with difficulty at wrist, and both here and at heart varies within a short period from a rate of 60 to 100, or the reverse. Has not had any digitalis, but double quantity of gin since last report. An obscure plane sound is all that is heard over heart. Expectoration copious, and cough troublesome. In his legs, which had become largely distended, incisions were made on the 6th; they became erysipelatous and occupied by ulcers on the 12th, and he died on the 14th.

Inspection, sixty hours after death.

Thorax.—The left pleura contained about twenty-four ounces, the right forty ounces, and the pericardium four ounces of transparent but very bloody serum.

The right ventricle, as seen *in situ*, was covered by fat. The pulmonary artery much distended and pressing on flaccid aorta. The heart, including large vessels, weighed twenty-two ounces, and all the cavities were enlarged. The right auriculo-ventricular opening measured, when gently stretched by compasses, two inches and three quarters; the pulmonary orifice one inch and three quarters; the aortic opening one inch and a quarter; the mitral two inches and a quarter. The left ventricle was very flaccid, and of twice its natural size; the membranous portion of the mitral valve was thickened, and contained some points of bone. The aortic valves were slightly more opaque and thick than natural. The inner surface of aorta deeply injected, of a bright red colour, and sprinkled with numerous points of a pearly whiteness and purulent-like aspect as far down as the bifurcation. In the abdominal aorta the redness occasionally acquired a darker hue, and was collected into patches surrounded by healthy tissue; but higher up the colour was diffused and continuous over whole of inner surface. To the touch, and also to the eye directed on it horizontally, there was a sensible roughness of the serous coat.

The right lung weighed seventeen ounces; whole of upper and middle lobes highly emphysematous; lower partially hepatized. Bronchial lining thickened, but not greatly congested. Left lung weighed twelve ounces, and was pressed into posterior thorax by heart; it was also emphysematous.

The liver weighed three pounds, and was full of blood. The kidneys weighed six ounces each, and were mottled by fatty deposit. Spleen, three ounces in weight.

4th Series. Conjoint disease of aortic and mitral valves.

Case 34.—*Probable albuminuria either of a primary or secondary kind. Great acuteness and apparent suddenness of* *symptoms. Considerable affection of mitral orifice indicated by pulse.*

David Rattray, aged 56, a tailor, admitted 11th September. Five weeks ago, after exposure to cold, this man was seized with cough and flying pains in the chest, chiefly in præcordial region. Eight days ago, he was bled from the arm with relief. On admission, he complains of cough, dyspnœa, and a constant feeling of vertigo. Expectoration scanty, frothy, and slightly tinged brownish. Inferior extremities as far as knees are swollen, and pit on pressure. Swelling first observed eight days ago. Pulse 104, irregular in strength, and intermittent. Tongue white and loaded. Bowels slow; face slightly livid; skin natural; sleep disturbed.

Chest sounds pretty equally when percussed. Sounds of heart are heard over all chest anteriorly, and faintly behind. Impulse increased and irregular. Pulsation of subclavians and carotids stronger than natural. Respiratory murmur distinct over most of chest, at some points mixed with small mucous rattle.

The pulse became so feeble that it could not be numbered; hemoptysis took place with great increase of dyspnœa and livid face, till death, which ensued on the 17th.

Inspection.—Head. Much turgescence of *pia mater*, and of the substance of brain; the lateral ventricles were considerably dilated, and contained serum.

Thorax.—The heart lay nearly transversely, and was twice its usual size. The walls of left ventricle were hypertrophied to twice their normal thickness, while the cavity of the ventricle was nearly natural. The auricles of both sides were much enlarged; the right ventricle much dilated, and its walls rather attenuated. The valves of the left side were thickened at their attached edges. The substance of lungs was engorged.

Abdomen.—The liver was of usual size, much congested. The spleen unusually small and firm.

In the right kidney there was a cyst of the size of a walnut.

Case 35.—*Probable acute primary albuminuria, followed by disease in aortic and mitral valves, dyspnœa and engorgement of liver, but without dropsy, of six weeks' standing. Death from pneumonia.*

John Anderson, a baker, aged 30, admitted 9th August 1848.

About four months ago, this patient, after repeated exposure to the vicissitudes of temperature, took a cold accompanied by a severe cough with bronchitic frothy sputum, which has continued ever since. About three months ago, he became affected for about a month with diarrhœa, tenesmus, and a burning heat about rectum. This debilitated him exceedingly, and his feet became swelled. Abour six weeks ago, he began to complain of dyspnœa. This has increased within the last week, and is at times so urgent as to prevent him from sleeping, and to cause him to sit up in bed frequently.

The liver is felt somewhat enlarged towards the left side and downwards.

The action of heart is feeble, the sounds are well heard over the chest. A loud continuous rasping murmur is heard over the site of the aortic valves, in the direction of aorta, and in the course of the carotids. It is present, though somewhat less loud, at the axillary border of left mammilla, over the mitral valve. In other parts of the precordial region, it loses its rasping character, although it still remains continuous. The heart's impulse is moderate; the pulse at wrist is 140; at heart, 160. The carotids throb strongly; and the jugular veins are slightly turgid. Percussion over chest is good; some sonorous and chirruping rhonchi are audible on right side; and some vocal sonorousness over the course of the large bronchi. He complains of severe cough, with frothy bronchitic sputum. Inspirations forty per minute. Tongue slightly furred; appetite bad; bowels open; urine, sp. gr. 1012, and albuminous.

To have four ounces of wine daily. Sulphate of iron, half a drachm; sulphate of quinine, one scruple; aromatic powder, one drachm. Mix, and divide into twelve portions, one of which may be given every six hours. To have a sinapised foot-bath morning and evening.

12*th*, Increase of cough, and for last three days there have been aphonia, and some serous expectoration; pulse 96.

Omit the powders, and let him take take the fourth of a calomel and opium pill every two hours.

14*th*, Pleuritic friction sound with accompanying pain over left false ribs; pulse 96. Two ounces of blood to be drawn by cupping from affected part, and a blister to be afterwards applied. Continue the calomel pills.

15*th*, Has not been using his pills regularly; extension of pain around situation of diaphragm with persistence of friction sound; some hæmoptysis; pulse 108, extremely soft.

To have one drachm or two drachms, as may be borne, of antimonial solution, every hour, and the blister to be repeated.

16*th*, The patient died at 7 A.M.

Inspection.—General surface slightly anasarcous; precordial dulness extended. On removing sternum and anterior parts of ribs, the lungs were found to have receded out of sight, the left being gathered up into the supra-mammary and posterior regions of the thorax, and the right was extensively adherent to ribs by adhesions, while the pericardium extended from the one end to the other of the sternum, and from the cartilaginous ends of the right ribs to beyond the line of the left nipple. It contained about eight ounces of clear serum, and some delicate flakes of lymph.

The heart was enlarged to nearly thrice its ordinary size. Its anterior aspect was thickly and generally covered by fat, and by a copious arborescence of variously-sized veins. The outer surfaces of the aorta and pulmonary artery were much injected, and the anterior and dextral aspects of the former were occupied by an elevated vascular band of œdematous cellular tissue, situated in the superficial coat of the vessel. This had an arched form, its highest point being one inch, and its lowest half an inch from the junction of the vessel with the heart, as it emerges from under the right ventricle. This band gave to the vessel an angular or elbowed appearance, and was evidently the level of the aorta to which the appendix of the right auricle, the superior edge of the corresponding ventricle, and the outer side of the pulmonary artery, rose and habitually rested during life. The right auriculo-ventricular opening gave for its longest diameter, as determined by gently putting it on the stretch with compasses, two inches; the pulmonary artery, one inch and a half; the aorta, one inch; and the mitral, two inches. The left ventricle was enlarged to twice its natural size; the septum measured five-eighths of an inch, and the walls half an inch in thickness. The valves of the pulmonary artery were perfect; those of the aorta useless. The coats of this latter were of a dull whitish yellow colour; the serous lining shrivelled; occupied by slight white deposits, and the valves thick and contracted, while one was occupied by a digitated or cauliflower-like excrescence of about the size of a small raisin, of a white colour and gritty consistence. The mitral valve was still transparent, but thickened and œdematous, as if containing some pellucid fluid between its layers.

Lungs.—The lower or diaphragmatic lobe of the left lung was hepatized, and strongly adherent to walls of thorax. The upper parts of lung were natural, and rather emphysematous. The bronchial tubes were filled with frothy slightly-purulent serum; lining membrane was congested, and straight fibres rather hypertrophied. In the right lung were strong adhesions of both pleuræ, and of their continuation between the lobes. Its structure and size were natural. Its bronchial tubes were congested, and similar in appearance to those of left side.

The liver was much enlarged, and engorged with blood.

The other organs were not examined.

Case 36.—*Cartilaginous and bony degeneration of aortal and mitral valves, with tuberculosis of the lungs; cardiac disease latent or unobserved.*

Thomas Ford, aged 74; 5th July. This man had been complaining for twelve months of pain in the epigastrium increased by pressure, of flatulence and acidity in stomach after meals, with urgent thirst, and loss of appetite. He had also severe cough with purulent expectoration, and piles; but the pulse was only 72, the skin cool, and the bowels costive. No new symptom is reported till four weeks afterwards (12th August), when he had had no stool for eight days, and had occasional hiccup. He died on the 21st.

Inspection.—The lungs, especially the left, were studded with tubercles, partially in the state of chalky deposit. There were no cavities, but some of the tubercles were softened.

The heart was of normal size (?), but the aortic and mitral valves were much thickened and indurated, and presented several small, rough, bony projections from their surfaces, and the aorta shortly after its origin became much dilated, and its internal surface studded by semi-osseous scales. At the lower part of the small intestines was a patch of ulceration.

Case 37.—*Endocarditis probably not observed, terminating in osseous and cartilaginous degeneration of aortal and mitral valves, associated with extensive tuberculosis, the symptoms of which are variously modified by the cardiac disease.*

James Lochead, aged 28, admitted 15th November 1837. This person was a patient in the house, from the 10th of January till the 8th of April last, with symptoms of dyspepsia, and slight chest affection, which yielded to local bleeding, blisters, and the exhibition of mercury, and afterwards the use of tonics. He has remained free from dyspeptic symptoms since the period of his dismissal, except that the cough, which returned with increased severity between four and five weeks ago, occasionally provokes vomiting. He has for the same period been much annoyed with breathlessness and precordial oppression, symptoms which are always aggravated by the cough, and by any exertion.

Sound of chest on percussion is pretty natural, except under right clavicle, where it is dull; and both there and in supra-scapular region, but especially in the latter, the resonance of the voice is greatly increased; crepitant rattle is heard in every part of breast and back. He complains of pain in the lower part of right side, and in region of heart, where there is evident bulging, but the measurement of both sides across the nipple is equal. The sounds of the heart are healthy, except after exertion, when the action is violent, especially in left subclavian region, and a bellows murmur is heard in subclavian artery of right side. In this situation there is very marked fulness, especially on coughing, and the impulse is considerably increased. Cough is excessively hard, dry, and painful. Expectoration very copious, greenish, and muco-purulent.

The face is anxious, sallow, and swollen; and swelling of lower extremities is brought on by walking. Urine is pale, and amounts to three or four pounds daily. Pulse 80, firm, and regular. Tongue slightly loaded behind; bowels regular. He was cupped, and put on calomel and digitalis, with some camphorated tincture of opium; and on the 3d of December the report is, nausea, and vomiting yesterday afternoon; cough hard, palpitation after coughing, or exertion; pulse 112; bowels slow.

Dulness in right side of chest has become general, and is greatest in its lower portion; fulness of intercostal spaces is very marked; measurement is more than an inch greater than opposite. Heart seems displaced, and is seen pulsating in lower lateral region of left side. Crepitus is universal on right breast and back, but very faint on left side; it is confined to breast, respiration being healthy, and very noisy on back. Action of heart is heard, and impulse felt all over right side, especially beneath clavicle, and bellows murmur is there very distinct. Bronchophony is heard under both clavicles, in a greater degree under right. Dyspnœa is increased, cough hard and troublesome, expectoration muco-purulent; fulness in situation of right subclavian artery is less marked. Has vomiting, and sometimes epistaxis on coughing.

On the 4th January, the report is, emaciation and debility advancing rapidly. Cough frequent, severe, and often producing vomiting, distinct pectoriloquy over a considerable space below right clavicle. Respiration is cavernous in same situation. Pulse 130. Percussion over chest is generally dull. Right side bulges in situation of third and fourth costal cartilages, and is there still an inch larger than left. Half an inch further up, and immediately to right of sternum, a distinct impulse is communicated on coughing; and a little above left nipple, a peculiar tinkling sound is heard when the patient breathes, talks, or coughs. There is a slight difference of measurement in lower part of chest, the left side being about a quarter of an inch less than right. Sound on percussion everywhere below right interscapular space is decidedly dull, but it is clear on left back. In the same portion of right back, where the dulness prevails, the respiratory sounds are still almost inaudible. The sounds of the heart are loud and widely heard, its impulse is increased, and the pulsation is strong in situation of both subclavian arteries.

He died on the 23d.

Inspection, thirty-two hours after death.

Head.—There was but little congestion of meningeal vessels. Considerable effusion into arachnoid cavity; a very large quantity beneath the arachnoid membrane, which was remarkably thickened and opaque over the whole convexities of the hemispheres. There was not much fluid at the base of the cranium. No appearance of tubercle was observed either in the membranes or cerebral substance.

Thorax.—About one pound of turbid serum was found in the right side of chest. A considerable quantity of half organised lymph was deposited on all the surface of the lower lobe, and connected it loosely to the costal pleura. The upper and middle lobes of the right, and the whole of the left lung had contracted very firm adhesions to the thoracic parietes; those on the left side, especially towards its upper portion, were remarkably dense. A cavity about the size of a small apple was formed at the apex of the right lung, and was half filled with curdy matter. Numerous smaller cavities, filled with similar matter, mixed with pus, were found in the rest of the upper lobe. The middle and lower lobes were for the most part impervious to air, and contained innumerable miliary and small masses of crude and matured tubercle, besides several cavities, one of which was the size of a small plum. The upper lobe of the left lung was also broken down into ragged cavities of various sizes; one of very irregular shape, and communicating with several surrounding cavities of considerable size, extended from the apex of the upper lobe to opposite the fourth rib (where metallic sound was heard during life), having a length of nearly four, and a breadth of two and a half inches; the lower lobe was much in the same state as that of right.

The heart bore marks of former inflammation on the anterior surface of the right ventricle. There was slight thickening of the walls of the left ventricle, the mitral valve was a little thickened and opaque, and a ridge of bony deposition running across the aorta, immediately above one of the semilunar valves, projected into the calibre of the vessel.

Abdomen.—The liver was much enlarged, remarkably firm, slightly congested. The gall bladder turgid, bile dark green. The spleen was dark, of large size, and fleshy texture. The pancreas was healthy. Both kidneys were slightly granular, and portions of both were pale yellow.

The stomach was loaded with mucus, its internal coat soft and thickened, of a dirty white colour. Scarce any disease in the course of the duodenum, which was remarkably pale. A few very slightly enlarged Peyer's glands were met in the jejunum and uppermost portion of the ileum, but none were seen lower down. The large gut as far as the descending colon was covered with ulcers of different sizes, some of which had almost perforated the bowel.

The mesenteric glands were much enlarged.

5th Series. Conjoint disease of Mitral and Aortic valves.

Case 38.—*Much cartilaginous mitral contraction; opacity of lining of left auricle; great pulmonic, hepatic, and renal congestion; jaundice.*

Anne M'Lauchlan, aged 35, admitted November 1, 1846.

This patient presented general but moderate anasarca, with fluctuant belly, dyspnœa, inability to recline, livid countenance, cough, sputa tinged with blood, palpitation, great weakness, inspirations 40; prominence of thoracic walls; clear percussion except in right hypochondriac and axillary regions, and also in precordia, where the dulness is extended. Faintness of respiration below on right side, while above it is loud and harsh. Over the anterior surface of the left thorax it is sibilant, and posteriorly there is small moist crepitation. The heart's impulse is weak. A strong bellows murmur is heard all over organ, loudest in left axilla about six inches below arm, and fainter at base of heart. It is heard behind. Pulse 116; appetite indifferent; has vomited blood on a former occasion, and has suffered from present symptoms more or less for about four months; much thirst; urine about half a pound in twelve hours; turbid; soon depositing a pink-coloured sediment, and is albuminous. Tongue clean; sleeps ill.

She had a mild mercurial course, and various combinations of all the ordinary diuretics; and the urine on the 23d is reported at three pounds, with four stools daily, and some jaundice. Death took place on the 27th.

Inspection.—*Thorax.* Pleuræ were natural, except containing a considerable quantity of transparent yellowish serum, especially on right side. The lungs were engorged with serum.

The heart of immense size from increased thickness and capacity of whole of its structures. The tricuspid opening permitted the transmission of four fingers, while the mitral allowed only one. The only valvular disease was in the latter and in the aorta. The anterior mitral valve especially, was much thickened and of cartilaginous density, as were the aortic also,—the orifice being contracted. In the left auricle the endocardium was thickened, firm, and opaque. The pericardium was adherent to the heart in front.

Abdomen.—About eight pounds of serum were contained within peritonæum. The liver was of small size, and very firm. The kidneys were of small size, external surface pale, but still mottled; internal structure friable, the pale, mottled cortical matter encroaching greatly on the tubular. The spleen was natural.

Case 39.—*Fibrous and osseous mitro-aortal disease of heart comparatively latent for about ten years; excited to activity by cold and fatigue; and again aggravated by exertion as a seaman six weeks before admission; injured by depletion. Death. Weight of heart thirty-two ounces and a half; length, seven inches and a half; and circumference at base, twelve inches and a half.*

Lewis Smith, aged 25, a seaman, admitted April 2, 1847.

This man says that, previous to going to sea seven years ago, he had been seven years a working shoemaker; that at about the middle of this period he began to be affected with dyspnœa during damp weather, and was subsequently obliged to discontinue the employment owing to pain in the precordia and occasional palpitation, and that since then he has been repeatedly attacked with fits of severe dyspnœa and palpitation. He never had rheumatism. Three months ago he was cast away at sea and exposed to cold and wet, after which he was seized with cough and dyspnœa, but in six weeks more, the symptoms continuing, though mitigated, he entered on another voyage, and, a few days afterwards, he became worse and has been unable for work since that time.

At present, palpitation, cough, and dyspnœa continue, with pain around precordia, inability to rest on left side or with his head low, and hurried respiration. Had some hæmoptysis for several days about three weeks ago. Pulse 124, full and abrupt, but compressible. During dorsal decubitus heart's impulse is strongest at about four inches and a half downwards and somewhat outwards from nipple, but most of anterior wall of thorax is visibly shaken. Cardiac dulness extends with greater or less intensity from nipple to apex, and for about the same distance (*i. e.* four and a half inches) from mesial line of sternum outwards to the left. A loud murmur accompanies the action of the heart. Over the commencement of the aortic arch this is double; elsewhere it is continuous and prolonged, being loudest of all at middle of sternum, next at apex and under the left axilla. The breathing is loud and harsh, most markedly so at posterior aspects of apices of lungs, where there is also resonance of voice. The veins of neck are enlarged in a slight degree.

The epigastrium tender. Tongue dry; thirst; bowels slow; appetite irregular; sleeps ill, symptoms being worst at night. Has never been dropsical.

Blood was drawn by cupping from the region of heart to six ounces, and on the following day the respiration became still more rapid, loud, and panting,—the patient being unable to occupy any position but the sitting and bending forward; he had some wine, and on the following day, when he was observed to be anasarcous, some gin. Next day he died.

Inspection.—Thorax. Lungs were infiltrated with serum; the bronchial lining in many of the tubes red, and the tubes filled with much frothy mucus. There were extensive old adhesion of both pleuræ, especially about lower parts of the lungs.

The heart was adherent to pericardium throughout by old organized lymph. The organ was of enormous size, and whe emptied of its contents it weighed thirty-two ounces and a hal and measured seven inches and a half from top of right auricle to apex, and twelve inches and a half in its transverse circumference a little below base of ventricles. All the cavities presented increase both of capacity and in the thickness of parietes, but it is particularly in the left ventricle that these changes are manifest. The cavity of this ventricle occupied more than one-half of the entire organ; at its base the walls had generally the thickness of one inch; lower down they became somewhat thinner, but were at no part as low as half an inch; at its thickest part the septum was three-fourths of an inch, and the muscular columns were developed in a remarkable degree both as regards number and size.

The tricuspid opening, when quite circular, had a diameter of an inch and a half, and its valve was healthy, but much expanded. The pulmonary valves were sound, and permitted but little regurgitation in the dead body. The mitral orifice was fully three-fourths of an inch in diameter; both leaves of the valve were thickened, opaque, and rigid. On either commissure was a considerable patch of warty deposition, of greyish-red colour and cartilaginous firmness, and admitting of being scraped off with some difficulty. In one of these patches was a small spiculated bony mass. The endocardium in neighbourhood of aortic orifice was opaque and thickened. The opening was between three-fourths and one inch in diameter. Its valves were thick, white, and rigid, like the mitral, and somewhat corrugated. They admitted of very free regurgitation. The left coronary artery was of great size. The commencement of aorta presented several white atheromatous patches; the coats of the vessel seemed unusually thin, but without appreciable dilatation.

Abdomen.—The liver weighed fifty-three ounces. It was not of great bulk; its section presented the nutmeg appearance, the colours strongly contrasted. The spleen weighed seven ounces, and was of pretty firm consistence. The kidneys were anæmic, but otherwise healthy in structure. Right, weighed five ounces and a quarter; and left, six ounces and a quarter.

Case 40.—*Fibrous degeneration of mitral and aortal valves, and narrowing of respective orifices, with dilatation and attenuation of both ventricles; heart sounds heard in right posterior thorax, and double rasping sound in cardiac region.*

Mary Dixon, aged 16. History of this young woman was unknown, excepting that she was labouring under a relapse of pulmonary and dropsical symptoms, from which she had had a recent very temporary and partial recovery under the use of rest and treatment. She had considerable œdema of lower limbs, and fluctuant swelling of belly, with dyspnœa and some pain increased by pressure over abdomen, particularly in right iliac region. Impulse of heart strong, and sounds heard over right side of back. A rasping murmur accompanies both sounds. Pulse is very weak and variable. Appetite very bad, and bowels slow.

She had little treatment, and on the fourth morning from admission she was found dead in bed, her face extremely blue.

Inspection.—Head.—Slight serous effusion under membranes of brain.

Thorax.—A large quantity of serum was contained within each pleura, and the lungs were compressed and œdematous, but otherwise sound. Both ventricles of heart were greatly dilated; the left being nearly as thin as right. The mitral laminæ were adherent and converted into a round opening, which with difficulty admitted the point of the index finger, but which must have been permanently open. The texture of the valve much thickened, changed into cartilage, and its edge tipped by several small soft projections. The aortic valves were similarly, though slightly thickened around the *corpora sesamoidea.* The orifice was small in proportion to the size of ventricle.

Abdomen.—A good deal of fluid, but no other particular lesion in peritoneum. The liver was congested. The kidneys were natural.

Case 41.—*Osseous and cartilaginous degeneration of mitral and aortal valves; dilatation and attenuation of ventricular walls; complaints of two years' standing; correspondence of heart's sounds with state of openings; relief from treatment; sudden accession of fatal pleuro-pneumonia.*

Robert Johnston, a dyer, aged 20, 29th July 1848. This young man was born of consumptive parents, but had tolerable health till two years since, when, after great fatigue and repeated exposure to cold and wet, he felt his strength decline, but he continued to work till five months ago, when his weakness had greatly increased, and he was affected with dull pain behind sternum, great palpitation, and shortness of breath. These symptoms continue, along with dropsy, jaundice, severe cough, purulent expectoration, rapid and laborious breathing, with inability to recline. A continuous murmur is heard over the seat of the heart. It is best heard under and to the left of left mamma, and more faintly over aortic valves and aorta; in other situations the sounds are ringing, and without any blowing murmur. Carotids throb violently, and jugular veins are very large, and distinctly pulsate.

Pulse 92, small, compressible, and irregular. Percussion dull in right submammary and in cardiac regions. Tongue dry and of a purple colour; much sleeplessness, and skin on legs threatens to give way. Specific gravity of urine stated at 1030.

He had half an ounce of wine, and the same quantity of a solution of supernitrate of potash, nitrous ether, and tincture of squill every four hours; and in five days more, a half grain of digitalis, with one of squill and ten of bitartrate of potash were added, and on the 14th August the report is, anasarca greatly diminished, and patient can now, for the first time since admission, recline. Other symptoms as formerly.

On the 25th it is stated, that heart's action continues violent and irregular, but without any perceptible murmur; pulse 116; and on the following day increased dyspnœa, with pain over anterior portions of lower ribs, where there is a double friction sound.

The wine was omitted; a warm cataplasm was laid over the lower anterior thorax, and he had twenty drops of antimonial wine every two hours.

Symptoms of prostration and sinking came on, and he died on the 6th September.

Inspection.—Large quantities of carbonaceous-looking fluid flowing from nostrils. About three inches square of parietes on left side of sternum dull on percussion, but on removal of this bone, not less than six inches of heart, in the direction of its long diameter, lay uncovered by lung. The pericardium contained about six ounces of fluid. The heart's length was seven inches, its breadth at base five inches and a half, and its circumference eleven inches. The cavities were filled with fibrinous clots. The weight of the washed heart was nineteen ounces. The left ventricle was thinned, and changed into a large flaccid bag. The mitral valve contained four or five clumps of bone, each as large as a boiled garden pea, and one of them somewhat larger. The opening was about one inch in diameter, and must have been persistently open before death. The aortic valves were slightly thickened at tips, and permitted regurgitation of fluid. The coats of the aorta were whiter and thicker than natural. The pulmonary artery was much enlarged, but the valves were healthy. The right side of the heart was not proportionally dilated to the left; but it consisted of one cavity only, so great was the dilatation of the communicating opening, and inefficiency of the tricuspid valve, which was also whiter and thicker than natural.

The left lung weighed twenty ounces, and was bound by adhesions at its lower lobe, where there was also a mass of hepatization of the size of an egg. The right lung weighed twenty-eight ounces; it was greatly congested and friable.

Abdomen.—The liver weighed three pounds and a half, and was of nutmeg appearance. Gall-bladder greatly distended by a light-coloured, watery fluid.

Kidneys hard and pale; right weighed five ounces and a half, and left six ounces.

The spleen weighed four ounces.

Case 42.—*Acute dropsy after exposure to cold and wet seven months before admission. Symptoms persistent. Atheroma of mitral valve and of aorta; great dilatation and attenuation of heart; strongly marked congestion of all the viscera.*

Letitia M'Mahon, aged 50, admitted 23d August 1837. This woman, seven months ago, after exposure to cold and wet, was seized with sudden oppression of precordia, and urgent dyspnœa, followed by swelling of the abdomen and extremities. These are now all enormoustly distended, the latter pitting on pressure, and the former fluctuating. Dyspnœa is very distressing, and approaches to suffocation during night, and particularly in the horizontal position. Cough is troublesome; expectoration muco-purulent and viscid. Considerable dulness of left chest; heart sounds faint, and impulse feeble. Pulse 108, weak; face anxious and livid; appetite poor; bowels loose; urine scanty and slightly coagulated by heat and nitric acid. In four days more some ecchymosed spots were noticed on right fore-arm, and on the following day she died.

Inspection, forty-two hours after death.—The spots on the arm were each surrounded by a small scab-like exudation, and were limited to the cutis. Copious escape of serum on cutting integuments, and from thirty to forty pounds, by measure, were removed from the cavity of the breast.

Thorax.—The pericardium contained fully one pound of fluid. The heart was of enormous size; the right ventricle was covered by fat; the cavities were filled with entirely fluid blood; the parietes were much thinned; the mitral valve and inner surface of aorta presented numerous atheromatous deposits.

The costal pleura of right side was raised into extensive vesicles by effusion of fluid. The lungs were heavy and congested; the lower lobe of left shrunk and fleshy. The bronchi were much reddened, and loaded with mucus.

Abdomen.—The liver was coated with thick, opaque, and puckered layers of secondary membrane, and was itself large and mottled; some of it extremely dark, and left lobe indurated, granular, and its interlobular structure congested. The whole extent of the hepatic vein was engorged with dark blood; the portal slightly so. Gall-bladder tense, and its contents thin, colourless, or slightly milky. A rounded membranous sac, unconnected with the gall-bladder, was situated at its neck, and being distended with limpid fluid, pressed on the *ductus communis*, so as greatly to obstruct it.

The spleen was shrunk, firm, very dark-coloured, and partially enclosed in false membranes.

The mucous coat of the stomach was greatly softened, and blood was effused in streaks under it.

The left kidney was enlarged, its lower end occupied by a cyst nearly an inch in diameter, filled by limpid fluid. The kidneys were firm, and their colour dark from great congestion. Several similar but smaller cysts in right kidney.

6th Series. Conjoint disease of Aortal, Mitral, and Tricuspid valves.

Case 43.—*Rheumatism followed in about two months by symptoms of indigestion, suppression of the menses, and cough, and in two months more by dropsy. Urine increased by diuretics with limited and very temporary benefit; great exhaustion, jaundice, and death.*

Marion Henry, aged 40, single, a domestic servant, admitted July 19, 1847. This woman suffered from articular rheumatism about eight months ago, at which time also she was affected especially when menstruating, or on the application of pressure to the part by a sharp lancinating pain immediately above the umbilicus, attended by cough, and in about two months by suppression of the menses. Four months ago the belly and limbs began to swell, she was troubled also with palpitation, dyspnœa, continuance of the cough and epigastric pain, and on the face appeared an eruption of numerous tawny patches like fading pityriasis. These symptoms continue.

The heart's action is tumultuous, the first sound is deficient in energy, and is accompanied by a slight rasping murmur heard most distinctly below the mamma; the second sound is loud, but when the patient becomes excited, the two sounds merge and constitute a continuous murmur, which is best heard at outer segment of left mamma, but also in the situation of the tricuspid and aortic valves, and of the ascending aorta and arteries of the neck. The jugular veins are enlarged.

Pulse 116, small, feeble, and irregular. In almost every part of chest there are heard coarse, sonorous rhonchi. She lies most easily on left side, and with most difficulty on the back. The liver reaches as far as umbilicus, smooth but tender. Urine scanty, and loaded with lithate of ammonia. Bowels slow.

She was allowed four ounces of wine daily; sinapisms and fomentations were directed to be applied to the epigastrium; half an ounce of the solution of supernitrate of potash was ordered every four hours; and cream of tartar as an occasional laxative.

On the 28th (nine days after), she began to complain of increased pain, when the wine was omitted, and one-third of a blue pill given every third hour; and on the 29th it is stated that she complains much of pain in left hypochondriac region; apparently hepatic; and says her left arm feels benumbed. Pulse 104; continuous murmur is heard with difficulty on right side of sternum, but scarcely in any other situation. Some hemoptysis.

The same line of treatment was continued. She had in addition black draught for the bowels, and taraxacum juice and nitrous ether were added to the solution of supernitrate of potash.

On the 3d August (fifteen days after commencement of the treatment) the eyes were jaundiced, the pain relieved; urine, which had been increased to about ten pounds, is now diminished to two pounds per day. Pulse 96, intermitting and irregular. Some œdema of feet. She was frequently found in the succeeding days without pulse at the wrist. Vomiting and purging came on under the use of gin only; and she died on the 19th August.

Inspection.—The external aspect of body was marked by numerous brown patches. The lips were livid, and discolorations most remarkable in upper parts and in situation of former blisters. The veins were bulging on arms.

A space extending from the sternal articulations of the third, fourth, and fifth ribs of the left side outwards about two inches, was dull on percussion. The shape of the thorax was cuboid; the anterior and posterior aspects being of unequal breadth, but both affecting the acute angular form at their margins; the sides deep and perpendicular, and the breast, and seemingly the back also, flat. Escape of fluid by nose.

Some orange-coloured fluid was effused within the peritoneum.

Agglutination of pericardium to diaphragm, and left lobe of liver in situation of former pain, and considerable effusion of lymph. The distended pericardium stretched from the cartilages of the right ribs to beyond the nipple of the left side. Throughout it was covered with branching, turgid vessels, and on the left by organized false membranes. About two pounds of fluid were contained in right, and one pound in left pleura. The gross weight of heart and envelope, after escape of about six ounces of serum, was two pounds and a half, and when partially freed from blood, two pounds and three ounces. More than three quarters of the surface of heart were glued to pericardium by lymph, in some places of a deep purple colour, and generally of the thickness of from one line to about one-eighth of an inch. The right auriculo-ventricular opening was enlarged to almost one inch and three quarters diameter, admitting the fingers and thumb with ease. The tricuspid valve considerably thickened, and in process of being converted into a cartilaginous tissue. The pulmonary valves were healthy, but readily allowed the escape of fluid. The left ventricle might hold easily about six ounces. The left auriculo-ventricular opening of the diameter of one inch and a half. It was surrounded by a cartilaginous ring, tipped by numerous small vegetations, and the extensions of the mitral valve were both cartilaginous in much of their substance. The orifice of aorta scarcely admitted the tips of two fingers. Its annulus and valves were both somewhat, although slightly, thickened.

The walls of heart were about the natural thickness, and somewhat soft. The lungs were healthy, with exception of some congestion. The bronchial membrane was thickened, corrugated into linear folds, and congested.

The liver weighed three pounds, seven ounces, was covered by white lines, and of a nutmeg like structure internally. The spleen weighed four ounces and a half, and contained a clump of yellow, somewhat reddish matter, having a well-defined margin.

The left kidney weighed seven ounces and a half. Right weighed six ounces. Both were far advanced in granular degeneration.

Case 44.—*Puerperal state succeeded by œdema of limbs and weak health; eighteen months afterwards pain in region of liver and dropsy; on admission six months subsequently, great pulmonary oppression and death. Granular kidneys; extensive disease in liver; fibrous alterations in tricuspid and sinistral cardiac valves.*

Mary Faulds, aged 30, admitted 11th June. This woman had, two years ago, after child-bearing, an attack of œdema of the lower extremities, which soon subsided, but her health has been rather declining since that time. Nearly six months ago, she was seized with pain in the right hypochondrium and right shoulder; hard, dry cough; difficulty of lying on the left side, dyspnœa; and soon afterwards the urine became scanty, and dropsy of belly and lower extremities ensued. The latter has now become excessive, with oozing of fluid from right ankle. The liver is felt enlarged. She complains much of flatulence, globus, and loss of appetite. The face and hands are of a purple colour. She speaks and breathes under great oppression. The pulse small and frequent, and subsequently intermittent.

Death took place on 18th.

Inspection.—About six ounces of serum were contained in the pericardium. The heart, particularly the right auricle, was much enlarged. The mitral, tricuspid, and semilunar valves of aorta were nearly of cartilaginous consistence.

The structure of liver seemed to be made up of red and white grains, the size each of a pin head, and uniformly mixed. The gland was greatly enlarged, extending nearly to the *umbilicus*, and occupying most of the left hypochondrium. The gall bladder contained twenty-three biliary concretions, of about the size of a pea each.

The spleen was softened; the omentum was redder than usual. The kidneys were hard in consistence.

Case 45.—*Swelling of body four years before admission. Recovery till last eight months, when she became amenorrhœac, and in five months more dropsical. Incipient gangrene of foot, and death on eleventh day from admission.*

Agnes M'Cormack, aged 40, admitted 9th October. Three months since, this patient observed the feet and ankles to swell, and six weeks since her belly, all which are now much distended. The face is yellow, rather swollen, and lips livid.

The impulse of the heart is strong, and shakes head at every pulsation. She complains of palpitation, occasional headach, and pain in precordia. The heart sounds are loud, and accompanied by a bellows murmur heard over whole of chest. There is an intermission after every sixth or seventh beat. Pulse 116.

The liver is felt extending along right side, enlarged. Some cough, and cannot recline. Tongue clean; bowels easy; appetite impaired. Has not menstruated for the last eight months.

Had a similar attack four years ago.

20*th*, She continued without particular change, till last night, when she began to complain of severe pain in the right leg, with increase of dyspnœa. Leg is much swollen, and dark in colour; breathing rapid; pulse imperceptible. Death speedily followed.

A few ounces of serum were contained in the pericardium. The heart was double usual size, the walls were hypertrophied, and the cavities dilated. The mitral, tricuspid, and semilunar valves of aorta were much thickened, and of firm cartilaginous structure. The valves of the pulmonary artery were all slightly changed, and the aorta was dilated, and had some small atheromatous deposits along its course.

The right pleura along its whole extent adhered by very firm old adhesions.

Case 46.—*Phthisis pulmonalis accompanied by atheromatous deposits on tricuspid and mitral valves, and on the larger arteries, which were not recognisable during life by any rational or physical sign, or succeeded by any other specific structural change.*

T. Fletcher, aged 42; married. This person complains of pain across the chest and epigastrium; cough increased at night; copious expectoration of purulent and mucous matter; dyspnœa; debility. He is much emaciated, sweats much, he has severe diarrhœa, and slight delirium. Pulse 108, soft, and very small; percussion of thorax pretty good; respiration harsh and bronchial; death in ten days.

Inspection.—Both lungs adhered throughout their entire surfaces to the *pleura costalis.* A large cavity, filled with a mucopurulent material, and communicating with various small bronchi, was seated in the apex of right lung, and the whole lung was studded by tubercles. Below it was congested, but crepitant. The left lung was solidified, and filled with tuberculous deposit superiorly.

The heart was very small, and there was a slight deposit of atheromatous matter in the mitral and tricuspid valves, as also under the inner coat, along the course of the great arteries. Tuberculous matter was found deposited, and ulceration had taken place at ileo-cœcal valve of intestines.

The kidneys were healthy.

Case 47.—*Fibrous degeneration of mitral, aortic, and tricuspid valves, associated with blocks of aggregated tubercles in upper lobes of lungs, and atheromatous deposition in aorta. Left ventricle large, dilated.*

Alexander Macalister, aged 50, a brush-maker, admitted 4th November.

This person has for two years been subject to attacks of rheumatism, and also to breathlessness, but he was never troubled with palpitation or anasarca till December or January last. He was admitted a patient into No. 10, in May last, and dismissed in June free from complaint. About the end of July, palpitation and dyspnœa came on with increased severity, and were followed by anasarca of lower limbs, and swelling of abdomen.

On admission, the abdomen continues swollen, but not œdematous. The lower extremities are very tense, and pit deeply on pressure; dyspnœa is greatly aggravated by the least exertion, and by assuming the horizontal position; cough is very troublesome, but attended by little expectoration. The left side of chest is extensively dull, it bulges visibly in the region of heart, and measures fully an inch more than the right side. The action of heart is loud, regular, and widely heard; a slight purring tremor is felt with the hand. Respiration is healthy in right breast, mixed with *sibilus* in left, and crepitant rattles are universal in back.

Urine is scanty, and high coloured; pulse 76, small, and feeble. Face swollen, and eyes slightly yellow. Tongue pretty clean, and digestive functions natural. The patient is addicted to the use of spirits.

Bowels to be opened by cream of tartar.

6*th*, To be cupped on region of heart; to have a blue pill every night; cream of tartar to be continued.

10*th*, Œdema of legs considerably diminished; other symptoms without material change.

Medicines to be continued, and to have half an ounce of infusion of foxglove three times daily.

22*d*, Is weak; the dropsical symptoms have entirely disappeared, and the palpitation and breathlessness are much alleviated.

Omit the medicines, and let him have six ounces of gin daily.

28th, Dismissed relieved.

11th December, Since dismissal on the 28th ultimo, all the symptoms have greatly increased. Countenance is livid and swollen, orthopnœa and distressing palpitation constant; cough frequent; lower extremities are again œdematous, and belly considerably enlarged. Action of heart is much louder, and impulse stronger than formerly. Crepitant and sibilant rattles are universal, and sputum is copious, yellow, and puriform. Urine very scanty, and high coloured; and occasionally deposits a white sediment. Pulse from 90 to 100, irregular, and very feeble. Tongue slightly loaded; appetite poor.

To have one ounce of bitartrate of potash.

13th, Became much exhausted, and died in the afternoon.

Inspection, twenty hours after death.

Head.—Not examined.

Thorax.—The left lung was free from pleuritic adhesions, but a good deal of fluid was effused within left pleural cavity. The remarkably firm adhesions which bound the right lung to every part of the thoracic walls and diaphragm prevented any fluid from being effused around it, but its substance was excessively engorged with sanious fluid. No tubercles were observed in the lower lobes; but in both upper lobes tuberculous concretions, hard, rounded, grating under the knife, and exhibiting, when cut into, the characteristic yellowish grey colour, and firm, cheesy consistence of tubercle, were found in considerable numbers. Some of these masses were nearly as large as a plum. No miliary tubercles were noticed. The bronchi were highly reddened, and loaded with mucus.

The pericardium was greatly dilated, and contained about fourteen ounces of flaky fluid. There were traces of old inflammation on the anterior surface of the right cavities, and round the roots of the large vessels. The heart was very large, and greatly distended with blood. The quantity of clots which issued from the ventricles being measured, exceeded two pounds. The dilatation of all the cavities, especially the right, was very remarkable. The walls of the left ventricle were likewise hypertrophied, but in a degree not nearly proportioned to the size of the cavity. The aortic, the mitral, and the tricuspid valves, were all more or less thickened and cartilaginous; the mitral valve most so, and its free border was fringed with thick deposits of cartilage. The inner surface of the aorta was atheromatous.

Abdomen.—The liver was greatly enlarged, and had contracted very dense and firm adhesions to all the surrounding parts, the diaphragm, the abdominal parietes, the ensiform cartilage, the neighbouring portions of gut, the spleen, and the pancreas. Its whole surface was coated with very thick and opaque false membrane. Its substance was very hard and granular, and the lobules were universally and highly congested. The interlobular tissue was much engorged with bile. The bile was abundant, thick, and tarry.

The spleen was small, and bore marks of inflammation. The pancreas and kidneys were healthy. The mesenteric glands were free from disease.

(*To be concluded in next number.*)

Art. II.—*Case in which Hydatids were expectorated, and one of Suppuration in a Hydatid Cyst of the Liver, communicating with the Lungs.* By Thomas Bevill Peacock, M.D., Assistant Physician to St Thomas's Hospital. (Read before the Royal Medico-Chirurgical Society, March 1850.)

During the summer of 1848 I had under my care a case in which suppuration took place in a hydatid cyst of the liver, and the abscess opened through the lungs; and, at the present time, I occasionally see a patient who has for some months been in the habit of expectorating hydatids. The particulars of these cases I propose to communicate in this paper.

Case 1.—*Suppuration in a hydatid cyst,—the abscess opening through the lungs.*

Mary Holland, aged 20, was admitted into the Royal Free Hospital on the 4th August 1848.

She stated at the time of her admission that she had been ill two weeks, but she was too much prostrated to collect any satisfactory history. It was ascertained that her habits had, for some years, been very irregular. She was slightly jaundiced, had pain in the region of the liver, with diarrhœa and vomiting and febrile symptoms, and her case appeared to be one of the usual form of low remittent fever prevalent at the time. After relieving the bowels by a dose of calomel and opium, followed by castor oil, she was directed to take small doses of the mercury and chalk and compound ipecacuan powder, with the chlorate of potash mixture at intervals; and on the 9th, in consequence of the urgent vomiting, the latter was replaced by the effervescent mixture with morphia and hydrocyanic acid; a small quantity of stimulant was at the same time given, and a blister was applied to the epigastrium.

On the 16th, she had sufficiently recovered to be allowed a more nutritious diet; but, on the following day, she had a relapse, and the jaundice, which had nearly subsided, became more intense. On the morning of the 20th, she was suddenly seized with violent pain in the lower part of the right side of the chest,—she became much collapsed,—the face was livid and shrunken,—the skin more deeply jaundiced,—she had a constant hacking cough, and this was soon followed by the expectoration of matter of a deep yellow colour and excessively fœtid odour. On the 21st, the following notes were taken.

Though up to this time she has lain on the right side, she now reposes on the left, and states that she has a severe pain in the right side, which precludes her lying upon it. She complains also of pain in the back, and there is very marked tenderness in the right hypochondrium. She is not much jaundiced, but the urine is high coloured, and the stools consist of small pale masses. She is much troubled with retching and vomiting, and has been very delirious during the night, and still talks incoherently. The pulse is 136 and regular. The tongue is coated with a thick white brown fur. She coughs a little, and expectorates a large quantity of fluid of the colour of porter and very fœtid. On percussion, the whole of the right side yields a less clear sound than natural; and below, and especially in front, there is entire dulness, and thus extends into the abdomen. A slight gurgling sound is heard on auscultation towards the lower part of the right side in front, and there is also a somewhat metallic echo with the cough and voice. She was directed to take the effervescent mixture with morphia and hydrocyanic acid.

To have iced soda-water and brandy at intervals, and half a grain of morphia and four grains of hyoscyamus at night,—a blister to be applied to the epigastrium.

23*d*.—She is somewhat relieved; the jaundice has nearly disappeared, though the stools are still clay coloured; the pain in the side is almost gone. The pulse is 120 and feeble. The tongue is red in the centre and at the edges, and has a thick yellow stripe of fur on each side. The lividity of the face is less, but she still lies only on the left side, is much troubled with the cough, and expectorates a large quantity of matter of a bright yellow colour, and the cough and expectoration come on immediately after she turns on the right side. At the lower part of the right side, in front and behind, there is still entire dulness; but, in the lateral region, there is an imperfect resonance on percussion much resembling the cracked pot sound. Respiration is heard, though feebly, over the whole of the upper part of the right side, and behind it is attended with some mucous rhonchus; below, both in the dull part and also in the lateral region, where there is the tympanitic resonance, there is an entire absence of respiration.

28th.—After the last date she gradually improved, though the cough and expectoration continued; but yesterday, about eleven o'clock in the morning, she became much worse, and again today, at the same hour, she had a similar attack. She is now extremely collapsed, has a hacking cough, and is expectorating large quantities of matter of a most offensive odour. It is composed partly of a thick matter slightly tinged with bile, and partly of masses resembling gangrenous lung mixed with a thin frothy fluid. The cough and expectoration come on in paroxysms, and she then for some time appears as if on the point of suffocation, and she is compelled to be propped up in bed; but, after a time, these symptoms subside, and though she is left excessively prostrated, she gradually rallies again. These attacks are immediately brought on by making her lie on the right side. The pulse is quick and very feeble; the skin bathed in profuse perspiration; the tongue is covered with a thick yellow fur; she is constantly more or less delirious; the jaundice is very slight, though the stools are pale and the urine very high coloured. She lies on the left side and has less pain in the right, but now complains of pain in the lower part of the left side, and the breathing is short and rapid.

On percussion a peculiar dull tympanitic sound is audible at the lower part of the right lateral region, and, over a space not much larger than the end of the stethoscope, situated three inches to the right of the xiphoid cartilage and below the edge of the ribs, percussion elicits a distinct cracked-pot sound. On auscultation a loud gurgling and somewhat tympanitic sound is audible with the respiration over the whole of the lower part of the right side, and, in the space before mentioned, it is especially loud and distinct. There is some dulness on percussion at the lower part of the left side laterally and posteriorly, and fine crepitation is there heard. She complains of palpitation, but the heart sounds, though somewhat loud, are natural.

Sept. 4th.—Since the last date she has continued much as before; the severe paroxysms of coughing and expectoration coming on at intervals, and leaving her in the state of extreme exhaustion. The matter which she has expectorated has varied somewhat in its appearance; sometimes it has appeared to be almost pure bile, at others it has been wholly or in part like partially-coagulated white of egg. She has been almost continually delirious and very restless at night, has been much troubled with retching and vomiting, and now passes urine unconsciously in bed. The sputum, to-day, is more like that of pneumonia, being very adhesive, of a russet colour, and contains small air-bells. She now lies on the right side instead of the left as hitherto. The jaundice is more marked, the pulse 140 and very feeble. The tongue is dry and covered with a whitish yellow coloured fur. There is some dulness at the lower part of the left side of the chest, and bronchial respiration with muco-crepitating sounds are there heard. On the right side the dulness at the lower part, in front and behind, still remains, and the tympanitic resonance of the lower lateral region. The gurgling respiration and the metallic resonance of the voice and cough are still heard there.

From this time there was little change in the symptoms till her death. The expectoration was less in quantity, apparently from want of power; the coughing and vomiting were incessant, and the prostration became extreme. On the 5th she passed a dark bilious coloured stool, and, the same day, an eruption of purpurous spots made its appearance on the chest. Throughout her illness her strength was only supported by the stimulant which she took, and she died exhausted on the 8th.

The post mortem examination took place the following day.

The liver was found of very large size, extending from the level of the nipple above to the umbilicus below, and quite over to the left side. The enlargement occupied chiefly the right lobe, which was closely attached by old adhesions to the diaphragm over a considerable portion of its extent, and displayed recent lymph in other situations. In the attempts to remove the liver and right lung entire and in connection, a cavity, occupying the lower part of the lateral and anterior region, was laid open. This cavity was bounded below by a large excavation in the surface of the liver, and above by the base of the lung, the intervening portion of diaphragm being destroyed. It contained fully two pints of thick opaque and whitish coloured purulent matter, mixed with air, and had floating in it a large collapsed acephalocyst.

The hydatid cyst was composed of dense fibro-cartilaginous material, varying in thickness from one eighth to one quarter of an inch. It was thickest at the sides where the remains of the diaphragm were expanded upon it, while above, where it was bounded by the lung, it was in some places imperfect, so that its contents were in contact with the substance of the lung. On closer examination it was found to consist of firm interlacing fibres, and its interior was lined by thick masses or plates of a deep brown coloured unorganised material containing much calcareous matter. These plates were in some places adherent to the interior of the cyst, while in others they lay loose in the contained matter.

On the surface of the cyst, imbedded in the liver, were seen numerous minute apertures, which passed obliquely beneath it, and along one of them a probe could be carried for fully one inch; some of these apertures probably communicated with the ducts of the liver, but the connexion was not distinctly made out. The collapsed acephalocyst, found floating in the matter contained in the cavity, was of a deep amber colour.

The right lung was displaced upwards by the pressure of the cyst, and its pleural covering was universally adherent to the parietes. The whole lung, with the exception of the front of the upper lobe, was more or less consolidated, and at the lower part the tissue was converted into a dense mass, containing portions passing into the state of gangrene, or completely sphacelated with irregular cavities evidently produced by the resolution of gangrenous masses. These changes particularly existed in the lung more immediately in contact with the cyst, and probes passed readily from the large bronchi into the gangrenous cavities.

The left lung was attached to the parietes by recent lymph of considerable thickness, more especially below, and the posterior and inferior parts of the lower lobe were solidified, and in some places passing into gangrene, in others entirely resolved into a diffluent gangrenous pulp.

The bronchial tubes in both lungs contained much dark-coloured frothy fluid.

On cutting through the liver, a second cyst, of less size than the former, was found situated in the posterior part of the organ. It was in every respect similar to that described, and contained like it a thick whitish coloured fluid with a collapsed hydatid. A third cyst existed between the duodenum and liver. This, which was the smallest of the three, was about the size of a small orange, had a sheath, very dense but thinner than either of the others, was lined by similar plates, and contained a simple acephalocyst, with the fluid in its interior deeply tinged with bile.

All the other organs of the chest and abdomen were examined, and found healthy and natural, except the kidneys, which were pale coloured, though not apparently from any deposit of foreign matter.

Case 2.—*Hydatids expectorated, probably from a cyst in the liver.*

Samuel Hewdibank, age 31, silk-weaver, formerly an undertaker, was admitted an out-patient of the City of London Hospital for diseases of the chest on the 18th July 1849, under the care of Dr Bentley.

When seen by myself on the 1st September, he stated that the indisposition under which he laboured was of fifteen months' duration, but that he had long been delicate, and had suffered from occasional pains in the right side of the chest. His present attack commenced with severe pain in the epigastrium, which came on suddenly, and was followed by sickness and vomiting. The bowels at the time acted regularly, and he had pain in the right shoulder blade, and was somewhat jaundiced. The pain recurred at intervals for about a month. When the attacks came on they usually lasted one or two hours, and were sometimes experienced two or three times a day, at others not oftener than once or twice a week. At the end of about a month he resumed his employment, but he was soon taken worse, and was not able again to return to work till after seven weeks from that time. He continued tolerably well till ten or eleven months before the time at which I saw him, when he was again suddenly seized, on awaking one morning, with severe pain under the edges of the right ribs, difficulty of breathing, and a hard cough, followed in a little while by expectoration. He then applied at the London Hospital, and the treatment there pursued relieved the pain in the side; but the cough continued and the expectoration became more profuse, amounting sometimes to a pint in the day. The sputum consisted at first of a yellow matter, but afterwards he occasionally noticed it streaked with blood, and, after severe fits of coughing, he sometimes expectorated solid jelly-like masses similar to those which he still coughs up.

His appearance is now very unhealthy. His complexion is pale, with a slight jaundiced tinge. He is thinner than formerly. His voice is husky. The tongue is coated with a yellowish white fur, and somewhat dry; the pulse 100 and feeble. He complains chiefly of the severe cough, which is attended with pain in the right side, and is succeeded by profuse expectoration of thick yellowish coloured matter, occasionally very fœtid, and containing masses of gelatinous material, evidently the debris of hydatid cysts. He cannot lie on the right side for more than a few minutes at a time, in consequence of the pain and cough which is excited. When lying on the back, also, he is much troubled with the expectoration. The cough is aggravated at intervals. He feels a sense of suffocation in the throat, which compels him to cough violently, and then, after a time, the masses come up, and the cough subsides.

Sometimes the severe suffocative cough occurs once or oftener in the day. At other periods he is free from it for several days or even a week, and he has only in the intervals a slight cough and scanty expectoration of pale phlegm. The quantity of the solid material in the sputum also varies much; occasionally he expectorates only one or two small pieces; at other times he has noticed fifteen to twenty, and some of them of large size; generally, the matter expectorated is offensive in smell.

The right side of the chest, especially in its lower regions, and the right hypochondrium, are evidently fuller than the opposite side; but the respiratory movements seem equally free. On percussion, the chest is found naturally resonant over the whole of the left side. On the right side the deep-seated dulness commences nearly an inch above the level of the nipple, and the superficial dulness about an inch below that body, and it thence extends to near the umbilicus and over to the left side.

On auscultation the respiration is good on the left side and at the upper part of the right, as far as an inch below the nipple, beyond which point it is inaudible in front, and slight subcrepitation is heard towards the lower part of the lung; about the lower angle of the scapula, the resonance partakes of the character of the cracked-pot sound, and cavernous respiration and the usual signs with the voice and cough, are there perceived.

Sept. 5th.—I have again seen him to-day, and he has brought with him a cup full of the matter which he expectorates. It is viscid, of a deep yellowish green colour, and slightly streaked with blood; its odour is offensive, and floating in it there are small pieces of collapsed acephalocyst of a deep amber colour, resembling those found in hydatid cysts of the liver into which the bile has penetrated. Under the microscope, the sputum consists of globules, resembling in appearance, and in the change produced upon them by acetic acid, the pus globule, of exudation corpuscles and of epithelium, mixed with which are portions of the gelatinous acephalocyst, with apparently remains of echinococcus and the small hooklets which surround the anterior extremity of the animal.

Dec. 15th.—Since the last date, I have seen this patient frequently. Upon the whole he is perhaps rather better. Within the last few days he complains that he has frequently experienced severe griping pains in the abdomen, followed by the passage of much flatus and hard clay-coloured fecal masses. The fits of coughing have latterly been less severe, but he still occasionally expectorates hydatids, sometimes several masses together, at other times only single. He can lie on either side, but is most easy when reposing on his back. His pulse is 98 and feeble. The conjunctivæ have a pale yellow tinge. The tongue is clean. He has, on coughing, some pain in the right hypochondrium and beneath the right shoulder blade, and slight tenderness on pressure in the former situation. The epigastrium is prominent. The right side is somewhat fuller than the left, especially low down. The dulness, on percussion, commences an inch above the nipple, and becomes entire about an inch below that body, and thence extends to the umbilicus. The respiratory sounds cease at the point of entire dulness, and on forced inspiration a slight crepitant rhonchus is audible in the lower part of the clear region, laterally and anteriorly. In the right dorsal region, percussion elicits a less clear sound than in the left, and a peculiar dull resonance resembling the *bruit de pot felé* with bronchial respiration, voice and cough, and an imperfect metallic resonance, are audible near the lower angle of the scapula. The sputum which he has brought with him exactly resembles that which I have before seen. It consists of a viscid yellowish coloured and opaque mucopurulent matter, containing masses of yellowish-coloured hydatid cysts, and on examination under the microscope the booklets are as usual found in it.

The hydatids are usually expectorated in the form of shreds of membrane, but occasionally he coughs up almost entire cysts, partly filled with fluid, and some of these are as large as marbles or walnuts. The larger masses are usually passed after severe paroxysms of coughing.

He is now taking quinine and iron with morphia at night to relieve the cough, and is allowed generous diet.

March 8, 1850.—There is now a great improvement both in his appearance and strength. The cough has nearly left him, but has been a little worse for the last few days, in consequence of his having taken cold. The expectoration is very much less in quantity, and, during the day, consists only of pale mucus; at night it is a little brownish coloured as before. It is nine weeks since he has expectorated any hydatids, and the suffocative cough has scarcely troubled him since that time. He can lie on the right side for a few minutes, sometimes as long as a quarter of an hour, without inconvenience, but after a time the cough and expectoration are brought on. He usually lies on the left side. His appetite and digestion are good, and the bowels act naturally. He has not recently suffered from the severe attacks of pain in the right side, and the constant sense of weight in that situation has left him. The pulse is 88 and feeble. He sleeps well at night; his ankles have nearly ceased to swell; and for the last month he has been able to follow his work more regularly than for the previous two years.

On examination, the base of the right side of the chest is somewhat fuller than the left, and the right side moves less freely. The complete dulness on percussion commences about an inch below the nipple, and extends to a little beyond the edges of the ribs. Beneath the lower angle of the right scapula there is an obscure *bruit de pôt felé*, and on auscultation cavernous respiration, voice and cough, are there loudly audible. Elsewhere respiration is good in the resonant parts. There is no evidence of any consolidation of the apex of either lung, and there seems considerable reason to hope that his health will be completely re-established,—the only unfavourable symptoms being the severe colicky pains in the abdomen which he still occasionally experiences.

REMARKS.

In reference to the first of these cases, the symptoms present during life were sufficiently indicative of the occurrence of an abscess in the liver discharging itself through the lungs. In the

absence, however, of any history of the state of the patient before her admission into the hospital, the precise nature of this abscess remained doubtful. During the period she was under observation, she presented no signs of inflammation of the liver sufficiently active to have led to the formation of an abscess; and the free intermixture of bile with the matters expectorated accorded more with the idea of the suppuration having occurred in an hydatid cyst than in an ordinary abscess. The detection of hydatids in the sputum could alone have afforded direct evidence of the true nature of the case; but, for portions of the cyst to have been expectorated, the communication with the bronchi was not sufficiently free. It is, however, possible, that if the matters discharged after the severe paroxysms of coughing had been examined under the microscope, the hooklets, or other remains of the echinococcus, might have been found.

In the second case, there can, I think, be little doubt that the cyst from which the hydatids escaped, is situated in the liver. The sudden accession of the more acute symptoms about ten months before he was first seen, appears to indicate the period at which the communication with the lungs took place, and the physical signs afford every reason to believe that the pulmonary affection is only secondary. It is true that acephalocysts have been found both in the lungs alone and co-existent in the liver and adjacent portion of lung; but such cases are of very rare occurrence, and hydatids, when developed in the lung; usually increase more rapidly and produce greater difficulty of breathing, than occurred in this instance. The deep yellow colour of the matters expectorated with the hydatids also concurs to show that the cyst is in connection with the liver.

From the number of pieces of membrane, or nearly entire hydatids, which have been expectorated at intervals for a period of thirteen or fourteen months, the primary cyst must be inferred to have been of large size, and to have contained numerous secondary cysts. It is also evident, from the bulk of some of the masses expectorated, that free communication must exist between the cavity and the bronchial tubes. It is, therefore, not a little remarkable that more serious constitutional disturbance should not have resulted from the free entrance of air into the cyst, and the suppuration of its lining membrane.

On inquiry I have found recorded several cases bearing a more or less close resemblance to those which I have detailed.

1. In 1772, Dr Collett* of Newbury communicated to the College of Physicians an account of a lady, 37 years of age, who suffered from indisposition for about three years, when a swelling appeared

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* Medical Transactions, Vol. ii. p. 486.

near the navel, and she had great difficulty of breathing and a violent cough. Some months after, she began to expectorate matter intermixed with portions of hydatids. In six months she had recovered her health to a considerable extent, but continued to expectorate the hydatids at intervals.

2. In 1776, Dr Doubleday* of Hexham related the case of a middle-aged female, who, after having for two years laboured under emaciation, difficulty of breathing, and other pulmonary symptoms, suddenly coughed up blood mixed with clear viscid matter like the white of eggs. The matter expectorated amounted to a basonful, and contained a number of pellucid vesicles, varying from the size of a large pea to a pullet's egg, mostly burst, but seeming to have contained all the glairy matter spat up. After expectorating these bodies, she recovered a better state of health than she had enjoyed for a long time, and was seen quite well several years afterwards.

3. In 1784, Mr Hill † of Dumfries reported two cases in which hydatids were expectorated. One of these was that of a girl ten years of age, who after an injury of the side had pain and tenderness in the region of the liver and epigastrium, with difficulty of breathing and cough. She then expectorated blood mixed with matter, and the globules and membranes of hydatids. This was followed by swellings in the right hypochondrium, which broke and discharged matter containing the remains of hydatids. After some months the openings healed, and she entirely recovered her strength, and continued well for thirteen years, when tumours again formed in the abdomen or abdominal parietes, and disappeared after a discharge of masses of hydatids from the bowels.

4. The other case related by Mr Hill is reported very concisely. The patient, after suffering from pain in the side and cough, expectorated bile mixed with vesicles like the skins of gooseberries, and after a time recovered.

5. In 1785, Mr Johnson ‡ of Lancaster published the case of a lady, 49 years of age, who had been long troubled with pain in the right side and symptoms of hepatic disease. In September 1779, she was attacked with cough and difficulty of breathing, and, in March 1780, she began to cough up hydatids, and these continued to be expectorated till January 1783, after which she to a considerable extent recovered her strength, though the hydatids continued to be occasionally expectorated.

6, About the same period, Dr Simmons § detailed the case of a female, 44 years of age, who had a tumour in the abdomen, which commenced after her confinement in 1772. In 1781, when she came under Dr Simmonds's care, the abdomen was much swollen, and she had dyspnœa, cough with expectoration, and hectic fever. The abdomen was tapped, but only two quarts of fluid were evacuated, and she died a fortnight after.

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* Medical Observations and Enquiries, Vol. v. p. 143.

† Medical and Philosophical Commentaries, Vol. ii. p. 303.

‡ London Medical Journal, Vol. vi. p. 293.

§ Medical Communications, Vol. i. p. 101. A case, probably somewhat resembling this, is referred to as seen by M. Esquirol. Jour. Gen. de Med. T. xvii. 2me serie, T. vi. p. 363.

On examination, the abdomen was found to contain, attached to the liver, pancreas, mesentery, and peritoneum, a large cyst filled with hydatids. The right lung was pushed upwards, but not apparently diseased, but the left was in a great degree destroyed by suppuration, and the left side of the chest was almost filled by a tumour, which communicated with that in the abdomen by an aperture through the diaphragm, and opened into the diseased lungs in several places. In this case, which bears considerable similarity to that first related by myself, it does not appear that hydatids had ever been observed in the matters expectorated during life, but Dr Simmons remarks that they might have been so discharged had the patient survived.

7. In one of the volumes of the Journal de Medecine[*] for 1801, the case of a young man who expectorated hydatids is reported by himself. He states that he had attained the age of 27, without having suffered from serious indisposition, when, after exposure to cold and damp while on a journey, he was seized with severe pain in the left side, which, though soon relieved, recurred after an interval of two months, and continued to affect him for three months, at the end of which period he suddenly coughed up a large quantity of pale-coloured albuminous fluid. At this time he was under the care of Corvisart in one of the Parisian hospitals, and soon after he first expectorated the fluid described, he began occasionally to cough up shreds of membrane resembling layers of coagulated white of egg. These continued to be expectorated at intervals for some months; but after having been very greatly reduced, he recovered his health, and appears to have been well at the time when he published the account,—probably about four years after the period of his first seizure.

8. In the year 1803, M. Baumes[†] of Nismes, communicated to the Medical Society of Montpelier the case of a young lady, 25 years of age, who had all the symptoms of phthisis and expectorated hydatids; she, however, under his treatment, obtained great relief, and ultimately recovered.

9. In 1811, a physician in London communicated to Dr Duncan[‡] of Edinburgh the particulars of the case of a female, 24 years

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[*] Journal de Medecine, T. ii, an ix., p. 295, "d'une maladie singuliere de Poitrine."

[†] Annales de la Soc. de Med. de Montpelier, l'an xi. T. 2.

[‡] Edinburgh Medical and Surgical Journal, Vol. vii. p. 490.

age, who was first seized with symptoms of pleurisy, for which she was actively treated. At the end of two months, a cough, attended with expectoration of matter of a very offensive odour, came on, and, shortly after, she began to discharge, after some paroxysms of coughing, pieces of transparent membrane, consisting of several layers, which were evidently the coats of hydatids. This discharge procured immediate relief to the pain in the chest and dyspnœa, and after a cough and slight expectoration had continued for three months, she regained her strength, but continued to suffer from pulmonary symptoms for a year and a half.

10. In 1816, M. Freteau* of Nantes related the history of a man, 26 years of age, who was suddenly seized with pain in the right side, from which relief was obtained by the application of leeches. A swelling, however, appeared in the right dorsal region, and on this being laid open an hydatid cyst escaped. Shortly after, he was seized with severe suffocative cough, and expectorated masses of hydatids. Altogether about 450 pieces were discharged by the wound, and 50 were coughed up. He entirely recovered.

11, 12. Laennec, in the first edition of his work on auscultation, published in 1819, after referring to the case before quoted from the Journal de Medecine, states, that he had seen a similar case at the Hotel Dieu at Nantes in 1798; and that a second was shown him by M. Ribes. Both of these cases recovered.

13. In the second edition of his treatise, Laennec further states that he saw, with M. Beaugendre of Quimper, a patient who, in recovering from some pulmonary affection, expectorated hydatids, and there still remained evidence of the cavity from which they had escaped. In all these cases, he regarded the cyst as situated in some part of the pulmonary apparatus, but he admits the possibility of a cyst in the liver discharging its contents through the lungs.

14–22. Recently, since Morbid Anatomy has been more extensively cultivated, a considerable number of cases have been described, in which suppuration having occurred in hydatid cysts in the liver, the abscess has opened through the lungs, or in which hydatids were expectorated, the precise organ from which they escaped not having been ascertained. Cases of this description are related by Dr Young,† Dr Billing,‡ Dr Elliotson,§ Dr Ridge,‖ Mr Barret¶ and Dr Watson,** in this country, by M. M. Husson* and Andral,† in France, and Hoering‡ and Kunde,§ in Germany; and it would probably not be difficult, by more extended research, to collect a larger number of examples.

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* Annales de Montpelier, T. xl. pp. 35 and 137.

† Medical Literature, 1823, p. 237.

‡ London Medical Gazette, Vol. vii. p. 542, and London Medical and Surgical Journal, Vol. vi.

§ Lectures.

‖ Guy's Hospital Reports, Vol. i.

¶ London Medical Gazette, Vol. xxi. p. 802.

** Lectures, Vol. ii, p. 513.

The great interest, however, which the cases in which hydatids are expectorated possess, lies in the opinion which should be given as to their probable result; and the enumeration which I have made, shows that they are of sufficiently frequent occurrence to be, in this respect, of importance in a practical point of view. Of the cases to which I have referred, twenty-two in number, in one the result is not stated; six proved fatal; in two the hydatids continued to be expectorated when the report was published; and thirteen recovered more or less completely, and some in a very short period after the escape of the hydatids by the bronchi.

Of these cases, however, in Nos. 7, 8, in which recovery took place, the history does not enable us to decide the precise organ in which the cyst from which the hydatids escaped, was situated. But, allowing for this inaccuracy, it will be seen that the results of these cases, warrants a prognosis not unfavourable.

Mr Cæsar Hawkins,‖ in a valuable paper published in the Transactions of the Medico-Chirurgical Society, has suggested that when a cyst in the liver opens into the lungs and hydatids are expectorated, it may be desirable, if its situation allow, to puncture the tumour, in order to afford a more direct escape for its contents. That this practice has in any case been followed, I am not aware; but in the instance of Barthelmy, related by M. Freteau, I have before stated that the chest was punctured. It is, however, probable that, in this case, the cyst was situated in the pleura, or in some part of the pulmonary apparatus. In a case, quoted by M. Valleix,¶ from an Italian Journal, M. Brugnon punctured the chest for an empyema, and the debris of hydatids mixed with pus made their escape from the pleura. In one of the cases related by Mr Hill, the cyst in the liver opened externally, and discharged hydatids, notwithstanding the communication with the lungs; and, in that which occurred to Dr Billing, there was also an external opening; but it does not appear whether this preceded or followed the establishment of the communication with the lung.

It will, however, probably not very frequently happen, that a cyst which has formed a communication with the lung, will also present externally, so as to afford the opportunity of being opened, and, upon the whole, the result which has attended the puncturing of hydatid tumours, does not much encourage the practice being had recourse to, except where the urgency of the symptoms demands immediate relief. It would probably be preferable to confine our interference to the endeavour to support the system, and to restore the general health; and the examples here collated show that a favourable result may be anticipated in a large proportion of the cases, when left to the efforts of nature.

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* Archiv. Gen. de Med., T. vi. 1824. p. 139. † Clinique Medicale.

‡ Quoted in Gaz. Med. de Paris, 2me serie, T. iv. from Wissenschaftliche Annalen der Gesammten Heilkunde.

§ Ibid. 2me serie, T. v. from Wochenschrift fur die Gesammte Heilkunde.

‖ Medico-Chirurgical Transactions, Vol. xviii.

¶ Arch. Gen. 3me et nouvelle serie, T. v. 1839.

Since this paper was communicated to the Medico-Chirurgical Society, a case, in which hydatids are at intervals expectorated, has been mentioned to me by my friend Dr Quain, who has further obligingly allowed me the opportunity of a personal examination of the patient. This case, being in progress, I shall not now report it, but shall hope hereafter to be able to relate the particulars in full.

ART. III.—*Observations on Chronic Hydrocephalus, Acquired, Sanguineous, and Congenital; with an Account of three Cases in which the Head was Punctured, and an Examination of the Effects of that Operation.* By FRANCIS BATTERSBY, M.B., T.C.D., F.R.C.S.I., Surgeon to the Dublin Institution for the Diseases of Children, Pitt Street.

MODERN French writers have, very properly, divided Chronic Hydrocephalus into two forms, the congenital and the acquired. The latter is much more rarely met with than the former. Barrier thinks that the greatest number of cases of hydrocephalus which are developed before the closing of the fontanelles, and in which the separation of the sutures takes place early and easily, should be ranged with congenital hydrocephalus.

I shall first consider *acquired* chronic hydrocephalus, premising what seems to have been overlooked by Dr West, that MM. Barrier and Rilliet and Barthez take into consideration only acquired chronic hydrocephalus, no children under two years of age being admitted into the Hôpital des Enfans Malades, of which they were *internes*, or resident pupils.

Barrier [*] says acquired chronic hydrocephalus is rarely essential, idiopathic, and analogous to other essential dropsies; at other times it is symptomatic of another disease, and in this case the organic lesion most frequently met with is without doubt the presence of one or of many tuberculous masses in different points of the brain. This has escaped the observation of various writers. One of the most frequent causes of this dropsy, say MM. Rilliet and Barthez,* following Barrier, is the developement of a tumour in the cranial cavity, which tumour is most commonly tubercular but which also may sometimes be cancerous or may be of another kind. We think, then, say they, that hydrocephalus had most often as its cause compression of the veins of Galen, the only ventricular veins, or of the straight sinus, and we cannot even conceive any other mode for its formation.

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[*] Traite des Maladies de l'Enfans, T. ii. p. 588.

Tulpius, Wepfer, Bonetus, Valsalva, and Lieutaud, remarked that acquired chronic hydrocephalus is developed most frequently from the age of two years to seven, and it is precisely at that epoch of life that tubercles of the brain are most common. Certain organic affections of the brain have been long noted as causes of the disease, such as scirrhous and tubercular tumours, encysted collections, and other morbid products found in the substance or the cerebellum and the other nervous centres. Facts of this kind are related in the Sepulchretum of Bonetus, in Morgagni's Letters, the Historia Anatomica of Lieutaud, and in the Anatomie Medicale of Portal. But it is to be regretted that in most of these facts there is no precise indication either of the seat of the tumours, or of their projection above the cerebellum. It is uncertain whether they were or were not adherent to the lower surface of the *tentorium cerebelli*, or whether they were prolonged towards the termination of the veins of Galen in the straight sinus. In a word, it is evident that if some of these observations are connected with our subject, the compression of the straight sinus, and the entirely mechanical mode of formation of ventricular hydrocephalus has been completely misunderstood.†

In the works of Lallemand, John Hunter, Daun, and Constant, are cases in which tumours existed in the cerebellum, together with a collection of fluid in the ventricles, but it is not said whether there was or was not a compression of the straight sinus. Tonnelé‡ has most completely misunderstood the influence which the obliteration of the sinuses exerts on the serous exhalation of the brain, since, in speaking of pseudo-membranous concretions in them, he puts forward the opinion, that the disorders resulting from their presence are, either a simple stasis of the blood in the veins of the *pia mater*, and of the substance of the brain, or a serous effusion within the ventricles.§

Mr Edward Ford‖ has recorded two cases—one in a child aged 9, the other in a child aged 4 years—of hydrocephalus resulting from a scirrhous mass in the cerebellum and *Pons Varolii;* and although he makes no mention of compression of the straight sinus, yet observes that *hydrocephalus internus* is in many cases not to be considered as a disease *sui generis*, or that it is of itself the sole cause of the mischief which ensues to the constitution, but that it is often the effect of those diseases it has been said to produce.

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* Traite des Maladies de l'Enfans, T. i. p. 808.

† Barrier, l. c., p. 598.

‡ Gazette Medicale de Paris. 1834. P. 104.

§ London Medical Journal, 1790, p. 56.

‖ Ibid. p. 598.

Magendie,[*] who attributes hydrocephalus, amongst other causes, to the presence of obstructions to the flow of the cerebro-spinal fluid through the ventricles, comes very near the explanation of M. Barrier. He has given different cases, in individuals aged above nine years, of hydrocephalus with compression of the fourth ventricle by a tubercle of the cerebellum; of the same with compression made by an aqueous tumour upon the aqueduct of Sylvius, the valve of Vieussens, and the fourth ventricle, with compression upon the mesocephalon and the fourth ventricle by an exostosis of the basilar portion of the occipital bone. And he moreover alludes to cases of hydrocephalus with compression of the fourth ventricle by a fibrous tumour developed in the valve of Vieussens, or by tumours of different kinds seated in the annular protuberance.

Barrier [†] gives three cases of hydrocephalus from compression of the straight sinus in children aged 3, 4½, and 5 years. As to the anatomical conditions which explain the formation of this kind of hydrocephalus, it is necessary, he says, 1st, That the tuberculous tumour should occupy the middle lobe of the cerebellum; 2d, That it should make superiorly a projection sufficiently considerable to throw up the *tentorium cerebelli*, and to compress the straight sinus.

The quantity of fluid in the brain of those cases of acquired chronic hydrocephalus never exceeds eight or ten ounces, and is in general much less.

Many authors have considered chronic hydrocephalus as a particular form of meningitis. Even were it so,—and we are far from thinking it,—the inflammatory character of the disease is too latent, or is effaced too soon after a certain time, for any practical advantage to follow the adoption of this opinion. It may be true in some cases; but in the greatest number the disease consists certainly in a dropsy analogous to that observed in all the serous membranes, and in the areolar tissue. This is Barrier's opinion, who adds, we do not think like Billard that chronic hydrocephalus succeeds almost constantly to acute meningitis. For ourselves, say Rilliet and Barthez,[‡] we have never seen chronic hydrocephalus purely inflammatory. We have not even seen acute cerebral diseases, accompanied by serous effusions into the ventricles, pass into the chronic state, and produce augmentation of the size of the head. Copland does not even refer to such a notion. Breschet states, that we have no well authenticated example of internal chronic hydrocephalus, which succeeded to acute hydrocephalus, or dropsy of the brain. But Dr West[*] affirms, that sometimes the lining of the ventricles is roughened and granular, presenting an appearance closely resembling shagreen, and communicating a very perceptible roughness to the finger; and concludes that these and other similar alterations of the lining of the ventricles afford conclusive evidence of the inflammatory origin of most cases of chronic internal hydrocephalus. In four cases, dissected by me, there was no appearance of any adventitious membrane like this, which I think, may be, in the few cases in which it exists, explained by the irritating nature of the fluid collected in the ventricles. The same occurrence is observed in dropsy of the abdomen, speaking of which, Dr Copland observes, "as I have already shown, this fluid, owing to interruption of the depurating function, is often possessed of properties which induce inflammatory irritation in the healthy peritoneum, and which are more likely to have a similar effect when this membrane is punctured or otherwise divided."[†] In confirmation of the non-inflammatory origin of the fluid of hydrocephalus, I shall mention that Spengler and Barruel, having each of them analysed the fluid withdrawn from hydrocephalic heads, agree in thinking it not to be a product of inflammation, but simply the ordinary cerebrospinal fluid, enormously increased in quantity.[‡]

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[*] Sur le Fluide Cephalorachidien, p. 74. 1843.

[†] L. c. p. 594—603.

[‡] L. c. T. i. p. 807.

Breschet and Legendre[§] attribute to inflammation all affections, the result of hæmorrhage into the cavity of the arachnoid; which effusions, Dr Todd[‖] states, are of very rare occurrence. Rilliet and Barthez[¶] have seen three cases of hæmorrhage, from sanguineous exhalation, into the arachnoid, simulating hydrocephalus. The coagulum divides into two portions, one serous, the other solid. This assumes the appearance of a thin false membrane,—elastic, more or less resistent, and simulating occasionally the arachnoid. Sometimes it is really a fibrous membrane. The clots are found over all the circumference of the brain, but most frequently on its convex surface, either anteriorly or posteriorly, or at its sides. Most commonly they adhere to the parietal face of the arachnoid, more rarely to its visceral surface; but whatever the connection, their adhesion is slight, and they may be removed by the least traction.

Sometimes the fluid is serous, transparent, and limpid, of a more or less well-marked yellow colour, entirely resembling the liquid effused into other serous membranes. Occasionally it is muddy, yellowish-red, and evidently contains some bloody particles suspended in it. In some less frequent cases it preserves its transparency, but it has a reddish colour. This is blood mixed with serosity, and consequently more liquid than natural. In fine, on other occasions, the liquid is thick, muddy, brown, or chocolate-coloured, and like a sanguineous effusion of an old date. Blood pure and liquid is seldom observed.

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[*] On the Diseases of Infancy and Childhood, p. 88; also Dr Todd, Cycl. Anatomy, Part xxvii. p. 720.

[†] Dictionary of Medicine, Vol. i. p. 632. Portal states (sur l'hydropisie, T. ii. p. xxiv.) that the fluid is sometimes de mauvais goùt ou d'une extreme *àcrete.*

[‡] Medical Gazette, N.S., Vol. ii. 1846, p. 627.

[§] Revue Medicale, Dec. 1842.

[‖] Cyclop. Anatomy, Part xxv. p. 644, and Part xxvii. p. 717.

[¶] L. c. T. ii. p. 32.

They once estimated the fluid on both sides to amount to a litre, or nearly two pints. Enormous quantities like this are only found in very young children whose heads are unossified. When the sanguineous effusion is so great, it forms a pure hydrocephalus, presenting all the characters of a case of chronic hydrocephalus.

This effusion presents no well-marked characteristic signs which can separate it from serous ventricular effusion. Legendre, however, states that the first stage is marked by symptoms of cerebral fever or acute hydrocephalus, the second by those of chronic hydrocephalus, but that the first stage is not always followed by the second. He observed seven cases of it between the ages of two and three years. The age, say Rilliet and Barthez, appears to us to establish a difference between acquired chronic hydrocephalus-tubercular, or either, and sanguineous chronic hydrocephalus. They have never seen an infant of two years of age, or less, die of hydrocephalus in consequence of cerebral tubercles. Always at this age sanguineous effusion has been its cause. The elder Monro[*] used to employ many arguments against puncture in cases of hydrocephalus, except when water is accumulated between the membranes of the brain or in the arachnoid, from a conviction of the fatal consequences of the operation.

Neither are Barrier, Rilliet and Barthez, or Legendre, advocates for the operation in acquired chronic hydrocephalus, which may be suspected to be the result of a cerebral tumour, or of a profound alteration of the brain; and I do not think it can be attended otherwise than with ill success if attempted in cases of the acute form of hydrocephalus, attended with convulsions and strabismus.[†] Rilliet and Barthez are, on the contrary, of opinion, that it could only be advantageous in cases of arachnoid hæmorrhage.

The nature of the liquid to which the instrument would give issue, the depth to which it would be necessary to penetrate to reach the effusion, would point out, in a manner almost certain, the seat of the disease. It is very evident, in fact, that if the puncture gave issue to blood, to sanguineous, or even albuminous serosity, this would at once determine the form of the hydrocephalus. The diagnosis would not appear to us, say Rilliet and Barthez, less positive if the instrument gave issue to liquid after having passed through the *dura mater* alone. The importance of diagnosis in like cases is such, that they do not hesitate to propose the employment of this method.*

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[*] Monro on Hydrocephalus, p. 95.

[†] Medical Press, February 20, 1850, p. 116.

Such advice, from such men as Rilliet and Barthez, I felt anxious to test by experience, the more so as Legendre intimates that the favourable termination of certain cases of punctured hydrocephalus depended, most probably, on their being of this form.

The following case, very favourable to their views, soon presented me an opportunity of tapping the head.

Case 1.—*Congenital chronic hydrocephalus. Punctured eight times. Malformation of the brain.*

Eliza Dearing, aged nine weeks, admitted to the Institution for Diseases of Children, 31st January 1849, under Dr Croker, who kindly transferred her to my care. Her mother states that her head has been getting large since she was a fortnight old. It is nineteen inches and three-quarters in circumference, by twelve inches from the tip of one ear to the same point of the other. It is soft from the root of the nose to the occiput, and in the centre the soft place is the breadth of the hand between the frontal and parietal bones. Her eyes are straight; the pupils are half sunk below the lower lids, the white of the eyes being nearly all that is visible of them; vision is perfect. She feeds well. Her person and limbs are plump and well nourished. Her countenance, presenting the usual rounded fulness of a thriving infant, is plump and fresh coloured. Has no complaint except her large head; is constantly dozing; bowels generally confined. Her parents are young and healthy. I strapped the head with adhesive plaster, and applied over it a double-headed roller.

February 27. Head twenty-one inches by fourteen inches and a half. I strapped the head again; it is very soft; she cried much while it was being done. The strapping has diminished the horizontal magnitude of the head, which is not so long from before backwards. It is larger superiorly, the diameter between the ears being much more than formerly.

March 12, She seems in good health, and is getting fat. Head globular, and increasing rapidly in size, with a feeling of fluctuation. The roof of each orbit is thrust out perpendicularly, and the eyes are so sunken that it is only by an effort she can look at objects above her. The eyes are lower, and the portion of the orbits next the nose crepitates on pressure with the finger; bowels confined.

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* L. c. p. 47.

20th, The mother consenting to the operation of tapping the head, I this day, assisted by Drs Churchill and Colles, introduced an exploratory needle in the situation of the anterior fontanelle, about half an inch to the left of the longitudinal sinus. Fluid at once came away, when, withdrawing the needle, I passed in a very fine trochar, and withdrew seventeen ounces of clear serum, slightly tinged with blood, which did not come from the scalp. The fluid appeared to be directly under the *dura mater*. The scalp was quite soft and baggy after the fluid was withdrawn. During the operation Mr Colles held the head compressed between his hands. The child cried strenuously during it, but did not appear to suffer much. I reapplied the roller.

21st, She vomited in half an hour after the operation, and was cross in the evening. Eyes raised well. She slept last night well as usual, but is easily frightened, and starts out of sleep.

22d, Is very pale; grasps firmly anything placed in her hands. The arms constantly start, and she cries often; is very hot and restless; pulse very rapid,—not to be counted.

23d, Slept none till three o'clock A.M.; does not start since, but seems restless; pulse 160; skin hot; cannot suck, but swallows fluid well; the jaws are drawn together, and firmly closed; eyes sunk, and in constant motion.

24th, She slept some last night; this morning sucked a little by the lips, for her jaws are closed; will not take food now by them; audible hemming; no sensibility; quivering of hands, which are occasionally strongly clenched.

25th, Took the breast in her lips last evening, and twice today; drank also six cups of wine whey and of milk; is rather cold. She gets sudden fits of clenching of the hands, with rigidity of the arms, and hemming. Appears asleep, and will not swallow anything.

26th, Shortly after my visit yesterday she took the breast in her gums, sucked well, and has continued to do so. Slept well last night; is not hot now; cried this morning for the first time since the operation; is since disposed to sleep; looks pallid; protrudes the tongue; thumbs and hands flexed.

27th, Very easy to-day, and sucks better than ever; is now twisting the mouth; hands souple; thumbs turned in.

This was the only inflammatory attack she had in consequence of the operations, which I performed eight times, between March and August. I withdrew eighty-nine ounces of fluid, which was each time of a paler colour, until at the last it was quite limpid and colourless.

On the 29th of March she got an acute attack of Muguet which continued ten days. The thumbs were then natural and extended, the index fingers alone being flexed; these in their turn soon lost their flexure, and continued natural to the end.

The head was ossifying rapidly at the back, where the new bone could be felt to crepitate under the finger. During the entire progress of the case I kept the head bandaged; but so readily and quickly did the bandage fall off, that on the 9th of July I smeared the folds of the bandage with starch, which kept it immovably fixed in its place.

July 24th, Head twenty-three by sixteen inches. The irides are below the lower lids, vascularity of eyes, with watery and mucous discharge. Lies sleeping the entire day; for a few days past has been vomiting constantly. Is nearly motionless, and cold, no matter how much clothes cover her. The bandage has never moved, and the back part of the head, where uncovered by it, is highly œdematous and bluish. Sleeps sometimes with the eyes open. I loosened the bandage, and re-applied it over the entire head, but the œdema continued till her death, which occurred on the 4th August, two days after the last tapping. I saw her on the 3d, very well, smiling and good humoured, and she died at eight o'clock next morning, without having exhibited any symptom to explain the event.

At the time of her death, she was aged nine months, one week, and four days; death taking place four months, fifteen days after the first, and two days after the last puncture of the head. After the second, and all the subsequent punctures, the head rapidly regained its original size, so as on the day succeeding to be as large as before the operation; she never had the least power of supporting her head.*

Twelve hours after death, Dr Churchill and I examined the body. The œdema of the back of the head had disappeared. It seemed smaller than during life. The scalp was bloody posteriorly.

On dividing the *dura mater*, the brain at once appeared. It was quite smooth on its upper surface. There was no median *fossa;* at its inferior surface were some convolutions.

More than two quarts of clear serum were contained in one large central cavity, all traces of separation between the lateral ventricles being annihilated by the absence of the *fornix* and *septum lucidum* and the falx; the *corpus callosum* and choroid plexus were also absent. The posterior *cornua* of the lateral ventricles were also absorbèd in this central cavity, on looking down into which, through the fluid, from an opening in the upper part of the brain, we could observe in the situation of the left optic thalamus two small very thin sacs, formed of the medullary portion of the brain, raised by fluid underneath. The third ventricle was very shallow; there was no soft commissure nor Pineal gland. An ill formed narrow band of nervous structure stretched from the left side of this large cavity obliquely forward to join the right *corpus striatum*. The *corpora striata* and optic *thalami* were flattened.

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* This patient, who survived the operation so long, proves the error of Petit, who expresses his sorrow that all patients who underwent this operation died; for if a large quantity of water is drawn off, they expire in four or five hours after the discharge; if less be drawn off, they die more slowly, but never survived the operation above forty hours.—*Van Swieten's Commentaries*, Vol. xii. p. 248.

There was no lymph nor any evidence of inflammatory effusion on the inner surface of this cavity, which, formed of the white structure of the brain, was lined by a dense serous membrane, under which were observed small red vessels. The brain at its upper surface was not more than a few lines in thickness.

The cerebellum was very soft. The nerves were all perfect. The points at which the troisquart entered the brain were completely closed; they could not be discovered on the outer surface of the brain, but were marked at its inside by very small dark cicatrices.

Dr Watson states,* that the fluid of hydrocephalus does not coagulate; and the analyses of Bostock, Marcet, Barruel, Berzelius, and John agree in showing that this fluid is of the lowest specific gravity, and contains the smallest quantity of albumen and of saline ingredients of all the dropsical fluids; according to Dr Marcet,† its specific gravity is 1006·7.

The changes in the specific gravity of the fluid, extracted at each puncture in this case, sufficiently indicate the alteration in the amount of albumen.

The examination of the fluid, after each operation, was kindly undertaken by Mr Moore:—

1st Puncture,		March 20th,	amount withdrawn,	17 oz.	sp. gr.	1007
2d,	...	May 10th,	... ...	6½	...	1014
3d,	...	... 24th,	... ...	9	...	1012
4th,	...	June 4th,	... ...	11	...	1010
5th,	...	... 21st,	... ...	13	...	1008·5
6th,	...	July 5th,	... ...	11½	...	1006·5
7th,	...	... 23d,	... ...	10	...	1007
8th,	...	August 3d,	... ...	11	...	1006·5

Albumen was always present, but in very variable proportions; the quantity was sometimes very great, as at the second and third punctures, when it nearly equalled that in the fluid of ascites, forming, when heated, a solid mass like coagulated white of egg. It sometimes amounted to a mere trace, and the specific gravity was influenced by the amount of it present, so that the former became a measure of the quantity present.

Nearly the same salts were found in all the specimens, and generally in about the same proportions, viz., a large amount of the chlorides of potassium and sodium, small quantities of the sulphate of soda and phosphate of lime, and a little free alkali, which always gave the fluid an alkaline re-action. On one occasion, Mr Moore observed, on examining the fluid with the microscope, a crystal of oxalate of lime; and among the occasional matters observed by the same instrument, were bodies resembling mucous granules, flakes of coagulated albumen, blood-corpuscles, a few fat vesicles, vibriones, in the warm month of July, and after the fluid had rested twenty-four hours, and scales resembling epithelium.

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* Library of Medicine, Vol. v. p. 141.

† Copland, L. c. p. 606.

The next case was more speedily fatal, from the effects of inflammation.

Case 2.—*Congenital chronic hydrocephalus. Puncture of the head. Brain malformed.*

John Webb, aged nine months, admitted under my care on the 26th March 1849. The mother states she has had but one other child, which died of convulsions when a few weeks old. The father is rather silly, though for years past in the employment of Mr Mallet. This child is said to have been born prematurely, and to have been very small at birth. He has slight divergent strabismus since his first month, but his head is stated not to have been of abnormal size until he was two months old, when he had some fits. He has not vision since. The eyes are greatly depressed, eyelids covered with mucus; the pupils are nearly concealed by the lower lids. Above the eyes the orbital plate of the frontal bone, pressed downwards and forwards, crepitates under the finger. The head is of enormous size, twenty-four inches by fourteen inches and three quarters; very large blue veins in the scalp; one in particular on each side, runs in a wide and deep grooves in the skull, on each side, down the side of the head to the front of the ears. His head is enlarging daily; he cannot support it. The stethoscope applied to it detects nothing. His flesh is partly wasted, and very flabby. He at night felt fits of pain, from which he cries and roars. Since his seventh month has got two lower incisor teeth. Pulse 72, very weak, small, and irregular; stools natural; he passes much water; recognises no one, but used sometimes formerly to laugh; is still unrecovered; eats nothing. The mother is very delicate, with very little milk.

31*st*, Pulse 86. Does not now sleep overmuch, as he used; he often vomits his food; (he has been weaned since last report;) drinks and eats much; yawns repeatedly; head tense. The mother having consented to the operation of tapping the head, I this day did so in presence of Dr Churchill, introducing the same trochar mentioned in the preceding case, and in the same way, but without using the exploratory needle. The point of the trochar had scarcely entered, when a clear fluid began to flow, of which I removed nine ounces. The child got pale and vomited in a quarter of an hour. I enclosed the head in a double-headed roller.

April 1st, He slept only a couple of hours last night; mouth hot; lips dry; is very thirsty. Pulse 120. Head hot; skin cool; cries lustily; saliva runs from the mouth; bowels free; no stiffening.

2d, Slept none; cries to-day, and has made no water; arms straightened; fingers and thumbs flexed; yawns much.

3d, Pulse not to be felt; legs and arms straightened; thumbs and fingers are flexed; is quite dull, as if asleep.

4th, Pulse, legs, and arms as at last report. No unnatural heat of body or of head, which is soft. Cannot be induced to open his mouth, the jaws being firmly closed; is as if asleep, with the eyes half open, and glassy; breathes naturally. Left pupil dilated; he took some drink at 10 o'clock last night.

5th, Has been since perfectly inert, has only moved his head from one side to the other. Breathed easily this morning, but latterly with a catch. Heat of skin rather below natural. The head appears much smaller than before the operation. Hands clenched, arms and legs kept extended rigidly. At 12 o'clock I directed him to get a continuance of wine whey and weak chicken's neck tea, but at 6 o'clock P.M. I found he had had nothing since I saw him in the morning. He was then breathing naturally, but was entirely cold. I had some wine-whey made, of which he swallowed some, but soon afterwards breathing ceased by degrees, and he died in my presence without the possibility of fixing on the period.

Along with Dr Churchill, I examined the body about 13 hours after death.

The head measured twenty-two by fourteen inches. Body without rigidity. There was some attempt at completion of the parietal, frontal, and occipital bones, but the greater part of the head was composed of nothing but skin and *dura mater*.

I stripped off the scalp in the usual way, and with a pair of common dressing case scissors I easily made the horizontal section of the bones and *dura mater*, previous to which I in part emptied the head of the fluid by an opening at its top, by which it was at once seen that the fluid was in the brain, and not within the arachnoid membrane.

There was little blood in the longitudinal sinus. The falx was very shallow and imperfect.

The convolutions on the upper surface of the brain were obliterated. The brain formed a large bag, containing more than two quarts of clear fluid. It was about the falx so very thin as not to be discernible. It was generally hard, and of a greyish colour. At its back part, the white substance, to the depth of a line, was perceptible. In some parts in the interior it was softened, and presented large red vessels ramifying under its serous lining. There were large, loose, soft flakes of lymph covering these vascular patches, which were principally on the left side, and posteriorly; they were less on the right.

None of the central white parts of the brain were present. There was no *corpus callosum*, *fornix*, *septum lucidum*, fifth ventricle, or choroid plexus; and the same may, to a certain extent, be said of the optic *thalami* and *corpora striata*, from their flattened and unnatural appearance. The third ventricle was greatly enlarged from the separation of these parts by the contained fluid. There was no soft commissure.

The optic and olfactory nerves were yellowish and easily torn. The other nerves were healthy.

The *medulla oblongata*, *cerebellum*, *Pons Varolii*, and *crura cerebri*, were healthy and hard.

The specific gravity of the fluid withdrawn was 1006·5; it contained the same salts as were present in the fluid of the preceding case.

Observation of these and other cases has proved to me the extreme rarity of hydrocephalus in children from sanguineous effusion into the arachnoid. Moreover, in not one of the many cases of dissection of children who died of hdyrocephalus, recorded in the Medical Journals, am I able to trace any proof of their having arisen from this cause. With the exception of the cases of sanguineous effusion observed by MM. Serres,* Legendre†, and Rilliet and Barthez, I know of no others observed in children. Mr Prescott Hewitt ‡ and Dr Burrowes § are the only persons in this country who have noticed it in adults.

Dr West never saw a case proved by dissection of external or arachnoid hydrocephalus; yet he says, " I should regard any case as favourable for operation which, on the whole, there was good reason for believing to be one of external hydrocephalus, or in which the enlargement of the head had not been attended with indication of active cerebral disease. Though less promising, I should not reject the operation simply because enlargement of the head had been congenital; while I should always be more ready to operate if nutrition were well performed, than if the child were emaciated."[*]

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* Annuaire Med. Chir., p. 189. 1819.

† Revue Medicale, Dec. 1842—March 1843.

‡ Medico-Chir. Trans., Vol xxviii. p. 45. 1845.

§ Medical Gazette, Vol. xvi. p 710. A case of hæmorrhage into the arachnoid is given in the Medical Press, Vol. v. p. 326, by W. S. Stanley; and in the Gaz. Med. de Paris, 1834, p. 526, a case of hydrocephalus from this cause is detailed by Berard.

Led by Rilliet and Barthez, and West's description of arachnoid hydrocephalus, post mortem examination of Deering's case, could alone convince me it was not one of arachnoid hydrocephalus. The fluid withdrawn was bloody up to the last tapping, although congenital, nutrition was very well performed, and the child had the exercise of all its organs.

Again, Dr West states, "I regret I cannot answer, so satisfactorily as I could wish, as to the applicability of pressure in these cases. It is my belief, however, that cases of external hydrocephalus would be found better adapted than any others to treatment by mechanical means."[†]

That it was unsuited to, and even the cause of death in, the same case, is my belief, by forcing the fluid in the inferior cornua of the lateral ventricle through the optic thalamus into the two sacs found protruding that part into the large central bag. In a case of Trousseau's, the æthmoid bone was detached from its connections, and the infant died from the effects of compression caused by adhesive plaster.[‡]

It is my opinion, therefore, that in cases of congenital chronic hydrocephalus, with enlargement of the head, neither pressure nor puncture are to be relied on as a means of cure. These may be employed with effect, possibly, in cases arising from sanguineous effusion; but we have still to learn what are the characteristic types of this affection. Patients with congenital hydrocephalus, in which either of these methods have been tried, are supposed to have been cured thereby; but I shall subsequently show, that hydrocephalic patients will survive without either of these means being adopted with them; and if they do, it is only to be a burden to themselves and their friends. Mr Dendy is of the same opinion.[§]

The truth is, that effusions of fluid, constituting chronic hydrocephalus, are, comparatively speaking, very rarely found in the bag of the arachnoid, or between the membranes of the brain. Dr Monro says, "As I have not met with a single case in which the water was entirely on the outside of the brain, I cannot help suspecting that this happens much more rarely than is supposed by authors."[‖] Breschet states that the fluid may be found, 1st, Between the *dura mater* and the internal periosteum; 2d, between the *dura mater* and the cranium; 3d, between the *dura mater* and the arachnoid; 4th, in the cavity of the arachnoid; 5th, in

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[*] On Diseases of Infancy and Childhood, p. 93.

[†] L. c., p. 92.

[‡] Journal de Medecine, April 1843.

[§] Winslow's Psycholog. Journ., Monograph, p. 12. See also Van Swieten's Commentaries, Vol. xii. p. 248.

[‖] On the Brain, the Eye, and Ear.

the ventricles; 6th, or in the laminæ of the *pia mater*. This division is only made in obedience to the views of systematic writers on the subject. In all the examples given by him, the fluid was contained in the ventricles. Peter Frank divides internal dropsy of the head into *hydrocephalus meningeus*, where the fluid was found between the membranes of the brain; and into *hydrocephalus encephaloides*, where it was found in the cavities of the brain itself. This last, according to the testimony of the greatest practical physicians, is the most frequent, as Vesalius has already remarked.* Dr Watson† says, "When the cerebral ventricles are distended with water, we express the diseased condition by the term hydrocephalus;" and Mauthner‡ states that the fluid in congenital hydrocephalus is found in the lateral ventricles; and Meckel§ that "all observers agree in this, that in ventricular hydrocephalus the brain represents a thin membranous bladder filled with water, whose quantity varies according to the stage of the disease, and which by its form and structure appears to indicate at one time a more early, at another a later period, of its developement."‖

I have seen nowhere described a case of *external encysted* hydrocephalus like the following. The subject of it was a young male, found in the dissecting-room of the Royal College of Surgeons, of whom no history could be procured. The preparation is preserved in the museum of the College.

It consists of a bag of extremely delicate and semitransparent texture, capable of holding about six ounces of fluid, and tacked at several remote points by fine membranous adhesions to the serous surface of the *dura mater* lining the parietal bones. This bag was perfectly insulated, except from the adhesions first-mentioned. When first examined, it was plump, and filled with a clear thin fluid, which by its pressure had produced a fossa, proportionate to its size, on the upper surface of the brain, and which fossa or depression remained when removed from the influence of the bag. The brain and membranes were otherwise perfectly sound.¶

Neither have I anywhere seen, with the exception of a case by Dr Houston, a description of *internal encysted* hydrocephalus, such as existed in the two following cases, in both which the brain was malformed.**

The brain of the first of these cases I lately exhibited to the Surgical Society of Ireland.

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* Gölis on Water in the Head, p. 3.
† Library of Medicine, Vol. v. p. 97.
‡ Die Krankheiten des Gehirns, &c. Wien. 1844.
§ Dict. des Sciences Medicales. *Art.* Hydroceph. Chronique.
‖ Pathologischen Anatomie, Bd. i. p. 269.
¶ Catalogue Museum Royal College of Surgeons, Vol. ii. p. 206.
** Vide Dublin Medical Press, February 20, 1850.

Case 8.—*Congenital hydrocephalus. Brain occupied by cysts, and scrofulous material. Malformation of brain.*

Catherine Markey, aged six months, was admitted to the Institution for Diseases of Children, July 9, 1849. Her parents are young and healthy, and she is their first and only child. She was seized with fits shortly after birth; they continued to be repeated for some time. Her head is reported to have been of natural size until three or four weeks after birth. It is now seventeen inches and a half in circumference, by ten and a quarter from the tip of one ear to the same point of the other. The frontal bone is divided into two portions, and the head is open from the root of the nose to the occipital bone eight inches, and four inches and a half laterally between the sphenoid bones. She cannot hold it erect; it falls to whatever direction it is inclined.

The eyes are without any power of vision, and very much depressed, but are straight; the pupils are natural, and in great part concealed by the lower lids; the thumbs are turned in. The infant is very cross, except when in her mother's arms; food composed entirely of her mother's milk; she sleeps in day-time; not at all at night; she yawns continually; head hot.

August 15*th*, I this day tapped the head, introducing a very fine trochar, about an inch from the central line, in the situation of the anterior fontanelle, and removed two ounces of a perfectly clear and transparent fluid. She cried during the operation. The reason I withdrew no more fluid was,—what surprised me much at the time, but is explained by the post-mortem examination,—that no more of it would come off. This fluid was examined by Mr Moore, who described it as "perfectly clear, and nearly as colourless as water. It was slightly alkaline; sp. gr. 1006. It contained but a trace of albumen, becoming milky on addition of dilute nitric acid, but forming no decided precipitate. It contained a large amount of chlorides, some sulphate, and phosphate of lime. This specimen contains more chlorides and sulphate than the former one, and much less albumen."

October 1*st*, Her head is twenty inches by twelve. (Her mother's head is only one inch and a half in circumference larger, and is less than twelve inches from ear to ear). The infant constantly chews and grinds her gums; the orbital plates, instead of forming a right angle with the frontal portions, can be felt to form a circle with these parts; the eyes are partly sunk below the lids; the left is lower than the right, and is not closed when she sleeps; the eyes and mouth run water; is weaned three weeks; her head, where unossified, is diaphanous; on applying the stethoscope to it nothing can be heard; it does not appear she can live much longer.

November 5, Head twenty-one by thirteen inches; it has increased in size much superiorly; the openings of the head are eleven by seven inches; there are nearly two inches between the parts of the frontal bone; the frontal bones project much over the face, and laterally, and the entire head is manifestly greatly enlarged. The eyes are constantly in motion when she is awake, and are generally strongly directed to the right, but I never saw them turned upwards; she sleeps with the eyes half open; they nearly close when a candle is approached to them. Her legs and arms are rigidly flexed; on trying to extend them she cries; the fingers are stretched and separated; she starts frequently; rolls head about and chews. The veins of the scalp laterally, and of the forehead, are much distended, and the root of the nose between the inner corners of the eyes is black from the same cause; her hair is very thin, jagged, and partly erect; the back of the head is nearly bald, apparently from the pressure of her mother's hand in keeping the head up in her arms.

She is wasted to a skeleton; skin hangs in bags; the flesh of her cheeks is excessively flaccid; bowels almost constantly confined; she appears to hear, but knows no one.

Her mother gave me as an objection to taking her out, that whenever she did so the child always got severe fits of dyspnœa from the wind. As a matter of curiosity, I one day gently blew upon her face, when, to my surprise, every time it was done, she drew with a noise a deep sigh, during which her tongue was slightly protruded, both arms were thrust forwards, and she appeared to suffer considerable distress. The same result followed every time I have since repeated the experiment.

December 31st, The infant is much quieter; arms rigidly flexed; hands elevated and pronated; legs flexed and rigid; she constantly moves mouth and lips, as if tasting something; great projection and tenseness of the soft parts of the head; bowels too free.

She continued in the same state until the 24th of January, when she died, without convulsions, aged one year and four days.

I considered it useless to repeat the operation of tapping the head. She never made an attempt at uttering an articulate sound; could not recognise her parents, and it seemed to me very doubtful if she had the sense of hearing.

On the 22d of November, Mr Moore examined the urine of this child. It contained a small proportion of urea; was alkaline and ammoniacal; a deposit found in it contained numerous prismatic crystals of triple phosphate and some phosphate of lime. On November 30th, it was feebly acid, contained some urea, exhibited oil-globules under the microscope, and yielded fat to ether.

I made an examination of the body eight hours after death, assisted by Mr Leeper, to whom I am indebted for an excellent cast of the head and upper part of the chest, which is seen to be extremely emaciated.

The limbs were quite rigid, occupying the same position as during life; head very soft, the bulging of the soft parts having disappeared; emaciation excessive, the integuments of the buttocks lying literally in bags; the belly was very large and tympanitic; the glands of the mesentery were greatly enlarged; the lungs were quite sound.

The integuments of the head were very thin; no fluid was contained within the sac of the archnoid; the convolutions were indistinctly marked. In the interior of the brain there was nearly a quart of fluid, in the lateral ventricles, in various cells anterior to them, and in the centre of the brain. These cells in each hemisphere communicated together indirectly and indistinctly; they were of all sizes, the largest holding more than two ounces of fluid, and they were lined with a fine smooth serous membrane. In puncturing the brain, the trochar entered one of these cells. The brain over these cells was exceedingly thin, being not thicker than a sheet of writing paper. The inferior cornua of the lateral ventricles, lined by serous membrane, under which appeared long fine red vessels, were largely dilated by liquid; but they did not communicate, as between the two was a large transparent distended sac, holding four or five ounces of fluid, lying directly under the lower edge of the falx. On the anterior part of this sac, for about one inch, were a few very indistinct whitish transverse fibres, representing probably the remains of the *corpus callosum*. Underneath this cyst was still another one.

No part of the substance of the hemispheres was of a natural density. It was tough from the various cells, or hard and resistent to the knife at the outer parts of the lateral lobes, in which were embedded irregular-shaped nodules, the size of a garden-bean, of a yellowish colour, much harder than the central substance in which they were embedded, and which around them was quite fibrous. These nodules had much the appearance of scrofulous tubercles, but they were not separable from the surrounding brain as these usually are. That they are closely allied to scrofulous exudation would however appear from the result of the examination of a portion of them by my friend Dr Carte, who found it composed of "compound granular cells and molecular matter. There was not observed either brain vesicles or nerve tubes."

The interior of the brain was without blood, except the small veins underneath the serous lining of the lateral ventricles; there was a small quantity of it in the longitudinal sinus, much more in the straight and lateral sinuses.

The brain was unnaturally adherent to the base of the skull from the optic nerves posteriorly to the *medulla oblongata*, which was firmly united to the surrounding bones by a structure essentially fibrous. The falx, which was perfect and very deep, was also unnaturally adherent to the hemispheres by old adhesions, which readily gave way by pressure with the handle of the knife.

Between the *medulla oblongata* and left hemisphere of the cerebellum, in the subarachnoid space, was a cyst capable of holding more than an ounce of fluid; it had separated the convolutions of the cerebellum.

The cerebellum was of natural size, but was very soft, as were also the *crura cerebri.* The *Pons Varolii* was very diminutive, being scarcely larger than the *medulla oblongata*, which was very hard.

The olfactory nerves were very soft; the optic seemed natural, as also the third and fourth; the fifth, sixth, seventh, eighth, and ninth, could scarcely be distinguished, being intermixed with the fibrous morbid growth already described as surrounding the *medulla oblongata.*

There was no *fornix, septum lucidum*, fifth ventricle, soft commissure, choroid plexus, optic thalami, *corpus striatum*, or pineal gland. The *tubercula quadrigemina* were very indistinct; there was no *iter e tertio ad quartum ventriculum*, the fourth ventricle forming a little sac closed on all sides.*

Dr Houston, in the fifth volume of the Dublin Hospital Reports, has given the description of a very rare form of hydrocephalus, somewhat similar to this case.

The patient, a healthy-looking female infant, was affected on the day after its birth with slight convulsions. About the sixth week the convulsions ceased, but the child became more stupid, and the head began to enlarge. Its ears were sensible to sounds, the sense of taste seemed unimpaired; but its eyes, which were rolled downwards, appeared incapable of being affected by light. When a year old the head was enormously large and heavy, the fontanelles broad, and fluctuation perceptible all through the cranium. At intervals the infant voided large quantities of urine, the evacuation of which was manifestly followed by a diminution in the size and tension of the head, and alleviation of the stupor. The bowels were always costive, and it slept continually, except when hunger and thirst caused it to whinge. It lived for one year and seven months; and, for several days before death, it had severe convulsive twitches. The weight of the head appeared equal to the entire weight of the body. A preparation of the brain, preserved in the museum of the Royal College of Surgeons, presents the convolutions broad and flattened; and such was the quantity of fluid in the interior, that on the removal of the membranes, the brain could with difficulty be supported entire. In the situation of the *corpus callosum* a transparent membrane existed, scarcely concealing the fluid underneath. The lateral ventricles were vastly dilated by a limpid fluid, and thrown into one common cavity by the absorption of the *septum lucidum ;* they were likewise, as here shown, rendered multilocular by the presence of several firm, opaque, projecting folds. But, in addition to the ventricular accumulations, various sized cysts exist independent of them, and which continued to hold a fluid after the evacuation of the water from these cavities. There are two such cysts, each the size of an almond, in the site of the fornix and optic thalami. Two others exist in the anterior lobe of the right hemisphere, each capable of holding from one to two ounces of water, and perfectly distinct from each other and from the neighbouring ventricle. Those cysts were distended with fluid, and lined with membranes of the same character as those of the ventricles. The cerebral matter in their neighbourhood had undergone little or no change from that observable in other parts of the brain. The cerebellum and *Pons Varolii* were both very small, and much softened in texture. The nerves were perfectly formed and distinct at the point of their exit from the skull, though their origins from the brain could with difficulty be traced.*

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* A preparation of the malformed parts of this case, along with the tubercular material, and a cast of the head, is preserved in the Museum of the Royal College of Surgeons.

Case 4.—*Encysted internal hydrocephalus. Brain malformed.*—Robert Carroll, aged seven months, admitted under my care, July 16, 1849. His mother states that his head was not larger at birth than natural, nor until he was six weeks old. He is the fourth child of his parents, who are both young; the father is addicted to drinking. Two of their children died at birth, another is alive and healthy. This child had a fit when one month old. Since his third month the head is remarkably enlarged. It is now twenty inches and three quarters by twelve inches. He cannot support it, nor even turn it; it is very tense; body well formed, except for an inguinal hernia; hands clenched; seems to have the use of his legs; the eyes look healthy, but he does not appear to see. Pupils not dilated, contract when placed in the sun's light; he cries much, and is very stupid.

October 6th, He generally lies in a basket the entire day, but prefers to have his head hanging on his mother's arms lower than his body. Head twenty-one by twelve inches; face yellowish; eyelids close in the sun, and when asleep he directs his eyes from side to side, but never raises them upwards, or the pupils above the lower lids. He used to vomit more than now, which is not much. He frequently starts as if frightened, but used to do so more often; sleeps well at night; legs stiff, his hands contracted. His mother states that he does not seem at all sick.

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* Dublin Hospital Reports, Vol. v. p. 327.

November 15th, Head diaphanous, twenty-one by twelve inches and a half. The sagittal and coronal sutures are nine and five inches in length. Frontal bone not divided. The lambdoid suture unclosed. Flesh very soft and wasted; starts up frequently; legs and arms are flexed, and he cries whenever an attempt is made to straighten them. The anterior fontanelle is distended and tense. Bowels are habitually confined; yawns constantly. Urine muddy,—examined by Mr Moore, it was found feebly acid, sp. gr. 1014; urea normal; containing no albumen; deposit consisting of triple phosphate and phosphate of lime.

January 26th 1850, Head twenty-one and a half by thirteen inches. Is much as at last report. The soft parts of the head are more distended and tense. Slight convergent strabismus of left eye. The stethoscope indicates nothing.

February 1st, Has a number of spots of purpura on his head, face, and back of neck; none on his legs.

20th, Died this morning, purpura having become faint, with vibices on his head and legs. For some days had purging of a slimy bloody matter. He died aged one year and one month.

About nine hours after death, I examined the body.

Head excessively soft; no fluid in the arachnoid; convolutions flattened; the brain was superiorly very thin; at the posterior part of the left hemisphere, for the space of an inch, none of it existed, the fluid within being visible under the arachnoid.

The fluid, a perfectly clear liquid like water, to the amount of nearly a quart, was contained in either hemisphere, in a distinct, smooth, serous cyst, unconnected with the ventricles. These cysts had, on the left side, three or four very fine and tough strings running from one side of it to the other; on the right side was but one, nearly a quarter of an inch in diameter. These cysts occupied the entire of each hemisphere, from front to rear; they did not communicate; the falx between them was very perfect and very deep, and was united to either hemisphere by old and easily fragile adhesions. There was no blood in the longitudinal sinus, very little in the veins of the *pia mater*, and none in the brain, which altogether was very solid. The *Pons Varolii* and *medulla oblongata* might be said to be unnaturally so.

The *corpus callosum*, very tough, existed. The lateral ventricles contained about one ounce of fluid. The soft commissure and *tubercula quadrigemina*, the anterior commissure, and the anterior pillars of the fornix, all distinctly existed; but a strange alteration possessed the other parts of the lateral ventricles. Apparently from the compression of the cysts on each side, the *cor-*

pora striata, instead of being, as natural, nearly horizontal, were perpendicular; the optic thalami were very small; and the left thalamus had connected to it, nearly its entire length, the corresponding part of the fornix; the right thalamus was also connected, but to a less degree, with the right side of the fornix, which was very narrow and hard, and which, by its connection with the optic thalami, interfered with the connection of the *velum interpositum* and choroid plexus; the right side of the fornix was imperfect; the choroid plexus was natural, but hard; the walls of the fifth ventricle, nearly half an inch in depth, were very hard and thick, and were posteriorly entirely separated from one another, forming a direct communication with the third ventricle.

The *hippocampi majores* were very large, and carried forwards into the anterior cornu of the lateral ventricles; they were not symmetrical, and the *tæniæ hippocampi* were not visible.

There was no pineal gland. *

On the surface of the brain, in the right temple, was a clot of blood the size of a threepenny piece, adherent to the arachnoid, and some blood was diffused on the skull in its vicinity.

The petechiæ traversed the skin, and were seen at its under part.

Such cases as the two last we have no means of distinguishing from ventricular hydrocephalus. The symptoms of both are the same. The appearance of the head is identical in both.

The parents of Case No. 3 would not again consent to the operation, from which I could promise no good result; and for the same reason the parents of Case No. 4 were not induced to agree as to its performance, which indeed I regard as very fortunate, as it would have proved utterly useless.

These two cases disprove an error of Breschet's, who says, that the urine only deposits a whitish sediment during the course of internal chronic hydrocephalus, when the symptoms of acute dropsy of the cerebral ventricles are manifest.† In both there was such a deposit.

As to the cause of this encysted internal hydrocephalus, I entirely agree with Dr Carte, who, from a conversation I have had with him on the subject, is of opinion, that it is a form of hydrocephalus quite independent of inflammation, and arises from what may be termed an arrest of development of the proper brainy material. Fourcroy has noticed the large admixture of water with the cerebral subtance, and has pointed it out as one of those animal substances in which water exists in the largest proportion; from constituting as it does three-fourths or four-fifths, and in many instances seven-eighths of its entire weight. This fact, as well as the small proportion of its other constituents, is well seen in the following table by L'Heritiér :—

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* A preparation of the cerebellum and malformed parts is preserved in the Museum of the Royal College of Surgeons.

† Dict. der Medecine.

	Infant.	Youth.	Adults.	Old Men	Idiots.
Albumen, ...	7·00	10·20	9·40	8·65	8·40
Cerebral fat............	3·45	5·30	6·10	4·32	5·00
Phosphorus,............	0·80	1·65	1·80	1·00	0 85
Osmazome and Salts,	5·96	8·59	10·19	12·18	14·82
Water, ...	82·79	74·26	72·51	73·85	70·93
	100·00	100·00	100·00	100·00	100·00

Dr Carte thinks it not improbable that some one of these principles is wanting in the young subject, and that the water being, on the contrary, in excess, and not meeting the other constituents in a proper chemical proportion to form the brainy material, this disease is produced in the same manner as rickets, from want of a due proportion of phosphate of lime.

From the comparative analyses above stated, it appears that the minimum of phosphorus exists in infancy, in idiotcy, and old age; and that the maximum of water is found in the infant. This latter fact, says Mr Anderson,* is of practical interest, and affords some explanation of the *greater tendency to liquid effusions in early childhood* than in more advanced life.

I cannot help regretting my inability to procure a correct quantitative analysis of the brains in Cases 3 and 4. At all events, this explanation of the cause of encysted, as well as ventricular chronic hydrocephalus, would confirm the views of Spengler and Barruel (p. 49), as well as those of Barrier, Copland, Breschet, and Rilliet and Barthez, relating to the non-inflammatory origin of chronic hydrocephalus.

In the London Medical Gazette, April 15, 1842, Dr West has drawn up an account of sixty-three cases of chronic hydrocephalus in which the head was punctured. In two of these cases the puncture was accidental; while in five instances the results were not such as would justify classing the cases either as fortunate or unsuccessful. Fifty-six cases then remain, in forty of which the patients died; while in sixteen they are alleged to have recovered; in other words, the proportion of recoveries to deaths was as 1 : 3·5, or two out of seven of the total cases,—a comparison which Dr West, still considering as correct, has adopted in his recent work on Diseases of Children.

These figures would indeed indicate a very favourable result of the operation of tapping the head; but let us see if the sixteen cases reported as cured were really so.

Case No. 1, by Rossi, is taken from Monro on Hydrocephalus,

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* Todd's Cyclop. of Anatomy, &c., Part xxv. p. 588.

p. 146, who says, "had we been informed as to the sequel of this case, it seems to me not improbable that it would be found as unfortunate as the case published by Dr Vose of Liverpool, which he supposes to have been cured by puncture."

No. 2 is by Lizars, Edin. Med. and Surg. Journal, Vol. xvii., p. 243. It is strange Dr West considers this case as cured, as the dissection of the head is given at p. 471 of the same volume.

No. 3, by Russell, "obscure fluctuation remained three weeks after the last puncture, when calomel was given so as to affect the mouth, which shortly produced an absorption of the fluid, and removed all the hydrocephalic symptoms." I do not consider it possible to affect by calomel the mouth of a child aged between four and five months. Maunsell and Evanson state that salivation is never produced in a child under three years of age. Dr Chapman gives the case of a child six years of age, with whom calomel and 14½ lbs. of ung. hydr. of double strength were used before the gums were slightly ulcerated.*

No. 4 is the case of an infant hydrocephalic from birth, punctured by Graefe in the fourth month. The operation was repeated eleven times in six months. The fluid drawn off never exceeded two ounces; after the last puncture, the sutures closed. The child could walk and speak when a year old. The fluid was supposed to have been external to the ventricles.

No. 5, by M. Bedor, of which a short account is given by Dr Fourçade in the Gazette Medicale de Paris. There is no proof of the child having been cured by the operation, which was performed nine times. He died one year after the last puncture, which had left him *dans un état tres satisfaisant.* Examination of the brain discovered the right ventricle enlarged, and its walls thinned. Its superior part formed an infundibulum with three fistulous points, evident traces of the punctures.

No. 6, by Marsh, who has given a most imperfect account of the case. The child's head was punctured but once, and twenty-four ounces of fluid were withdrawn; the child is reported as cured without a single date of the day of operating, or of the time which elapsed before he was reported as cured.

Nos. 7 to 16 are the cases supposed to have been cured by Dr Conquest, all of which I cannot admit to have been successful, although Dr West does. *Neither does Dr Conquest himself assert that he cured ten cases out of nineteen.* He says ten were living when last heard of, and nine were dead, "but it is only fair to state, that as most of these children were amongst the lower classes of society, who are continually changing their residences, several have been lost sight of, and *may now very probably be dead*, although when last seen, some time subsequently to their being operated on, they were living."[*] Before any case can be admitted to have been cured by the operation, it must be shown that a considerable time elapsed since its performance, and that during this period the health of the patient was perfectly good. Mr Dendy[†] supposes about four of Conquest's cases to have been cured, but confesses he has not found its operation so favourable, while Rilliet and Barthez[‡] give him the credit of having cured three of them, which is as much as can be contended for.

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* Medical and Phys. Journal, Vol. lviii. p. 42.

Dr Conquest in his total number, operated seven times once, five times, twice; three, thrice; twice, four times; twice, five times. The three cases given as cured, he punctured, once, twice, and five times. In the others only temporary relief was afforded, from the reluctance of the patients to have the operation repeated. One of the cases reported as cured was brought to America, aged two years six months. In another, five years after the operation, ossification was incomplete at the posterior fontanelle, and there were two openings in the coronal suture. In the third, eight years after the operation, the head was too large, but not larger than before she was operated on.

In fifteen out of the nineteen cases of Dr Conquest no dates are given beyond the mere statement of the number of punctures, and the quantity of fluid removed. The age of the patient, the duration of the disease, the symptoms attending it, the size of the head, and the condition of the intellectual faculties before and after the operation, are not noticed, and we are left in perfect ignorance as to the time which elapsed before each patient was reported as cured.

Dr Conquest's direction, moreover, for performing the operation of tapping the head, is of a very vague and unsatisfactory kind. He directs the puncture to be made "midway between the *crista galli* process of the œthmoid bone and the anterior fontanelle," which, setting aside the difficulty of deciding at all accurately the position of that process in a head with so disordered proportions as is common in chronic hydrocephalus, in other words, declares the puncture should be made through the bones of the skull.

The table of Dr West's cases shows, he says, that sometimes the puncture was followed by an almost immediate aggravation of the cerebral symptoms, and by death; usually, however, a degree of apparent improvement followed the puncture, but the fluid soon collected again, and less marked relief followed the second operation. With its repetition, the quantity of fluid increased; and while the size of the head continued undiminished, or even grew larger, the body of the patient became emaciated,

[*] Medical Gazette, Vol. xxi. p. 969.

[†] Winslow's Journal Monograph, p. 41.

[‡] L. c., T. i. p. 811.

and death either took place from exhaustion, or cerebral symptoms came on, and life was terminated either by coma or convulsions.[*] Dr Ferguson says,[†] in one of my own cases, there was no improvement after half a dozen different operations, while sixty ounces of fluid were evacuated; and though the child is still alive, and the proceeding has not been repeated during the last twelve months, I doubt if the operation was of the smallest permanent service. The undiminished size of the head, in consequence of tapping it, was remarkable in another of Mr Ferguson's cases, as it was in case No. 1. of my own. Mr Holbrook[‡] despaired of curing a case after he had punctured the head three times; and Kilgour,[§] after repeating the operation four times, and withdrawing fifty-one ounces of fluid, left the case to nature, perceiving that the head was steadily growing larger, notwithstanding the punctures. In Dr Conquest's three cases reported as cured, the head was not diminished in size; in Graefe's, it is reported to have had the same circumference (18½ inches) as before the operation. In Mr Kitsell's, it is stated to have retained its diminished size; while, in Dr Whitney's, it was too large, and in Edwards' case, there is no account of the size of the head.

According to Mr Fergusson, tapping the head is a proceeding which can be thought of only in early infancy, while the overdistended cranium is yet soft and pliable;[‖] and this is the general view of all the operators, with the exception of Dr Conquest, who states, that " in no instance has clearly-marked congenital disease been permanently benefited, and those cases have done best in which effusion manifestly resulted from inflammatory action, and in which cerebral excitement followed the operation," an opinion not seconded by any one. The conclusion we are justified in holding, from an examination of the sixteen cases reported by West is, that not more than four of these (Graefe's case and three of Conquest's, which I still look on as doubtful) were cured.

There are three other cases reported as cured by Drs Whitney,[¶] Edward,[**] and Kitsell.[††] Whitney punctured the head twice, and withdrew nine ounces the first, and five ounces the second operation. Dr Edwards' case was aged 14 months when he tapped the head, and drew off eight ounces of reddish fluid. The trochar was introduced an inch, and there ensued an oozing of blood from the nostril for twenty-four hours. After the lapse of seven years, the child is reported as a fair scholar, and with every faculty good, but to be increasing in height more slowly than is usual at his age. Mr Kitsell's case was his own son, on whom he operated but once, at the age of eight months; sixteen ounces of a limpid colourless fluid were withdrawn. Instead of closing the wound with a compress and retentive bandage, the discharge of the fluid was encouraged by occasionally cleansing and opening the puncture, thus allowing it to escape probably as fast as it was secreted, and which continued about five days and nights, gradually subsiding after soaking a large number of napkins; the total quantity being computed at about four pints. At the end of nearly four months, the account is given of his being restored to perfect health, the head retaining its diminished size, the various sutures being closed, the anterior fontanelle much contracted and flaccid, and the cerebral pulsations being distinctly felt. I look on four months as too short a time to record a patient cured by the operation of tapping the head.

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[*] Medical Gazette, 1842, p. 138.

[†] Syst. of Pract. Surgery, p. 490.

[‡] London Medical Repository, Vol. xxiv. p. 345.

[§] Edinb. Med. and Surg. Journal, Vol. liii. p. 368.

[‖] Loc. cit.

[¶] American Journal of Medical Sciences, October 1843, p. 303.

[**] Edinburgh Monthly Journal, p. 398. 1846.

[††] American Journal, January 1850, p. 218.

Then, with regard to the forty unsuccessful cases quoted by Dr West, we should naturally imagine that they were the only cases on record in which paracentesis of the head had failed. It is, however, far otherwise. Monro states that, at Liverpool, after Vose's case, several cases were operated on, which died.[1] Breschet operated several times without success,[2] as also did Dupuytren three times.[3] Dr West has given a fatal case from Fabricius Hildanus.[4] A like unsuccess also attended the cases given by Tulpius,[5] Schenkius,[6] Ferdinandus,[7] Panarolius,[7] Muraltus,[7] Wepfer,[8] Forestus,[9] Francus,[10] Schenkzer,[11] Zang,[12] Junker,[13] Sorbait,[13] Petit,[13] Loftie,[14] Froriep,[15] Lee,[16] Vose,[17] Jeffery,[18] Dickinson,[19] as also the more recent cases of Wodroofe,[20] Watson,[21] Dendy,[22] Parkman,[23] Whitney,[24] Bellingham,[1] Taylor,[2] Campbell,[3] Storks[4] Martin,[4] Gotz,[6] Chater,[7] Ferguson,[8] Physick,[9] and the writer. We have already seen (p. 70), that Holbrook, Kilgour, and Ferguson punctured the head without effect, as also did Mr Dendy[10] five times; while Monro[11] and Watzer[12] opened the *dura mater* alone. Spengler and Barruel[13] appear also to have punctured the brain, but with what effect, I have been unable to learn.

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[1] Monro on Hydrocephalus, p. 147.

[2] Dict. des Sci. Medicales, Art. Hydroceph. Chronique, T. xv. pp. 545, 546.

[3] Ibid.

[4] Obs. Chir. Cent. iii. Obs. 17.

[5] Observ. Medicæ, lib. i. p. 47. [6] Obs. Various, p. 10. Frankfort, 1665.

[7] Monro on the Brain, the Eye, and Ear, p. 70. 1797.

[8] Obs. Medico Practicæ, pp. 49, 53, 60. Scaphhusii, 1727.

[9] Schol. ad Observat. 30, lib. viii. Schenkius, p. 10.

[10] Schenk. Obs. Med. lib. i. [11] Vallisneri Opera, T. i. sect. 5.

[12] Darstel. Blutig. Operat. bd. ii. 3 aufl. p. 68.

[13] Copeland's Dict. vol. i. p. 682.

[14] Medical Obs. and Inquiries, vol. v. p. 121.

[15] Notizen Aus dem Gebieth der Natur und Heilk. bd. v. No. 102, p. 224.

[16] New York Medical and Physical Journal, 1828.

[17] Medico-Chir. Trans. vol. ix. p. 354. Monro on Hydroceph., p. 146.

[18] Lancet, Vol. i. p. 617. 1836–7. [19] Ibidem, Vol. ii. p 42. 1838–9.

[20] Dublin Medical Journal, Vol. xxiii. p. 37.

[21] Library of Medicine, Vol. v. p. 147.

[22] Winslow's Psychol. Journal, Monograph, p. 11.

[23] American Journal, Vol. xvi. p. 299. [24] Ibidem, Oct. 1843, p. 305–30

An accurate examination of ancient and modern medical works would very probably discover other cases; but the above authorities, along with the forty cases in Dr West's table, give about 100 unsuccessful against seven alleged successful cases, or, in other words, one patient in 14 was cured by puncturing the head. But this proportion I do not regard as by any means exact, as I have known of the operation having been performed in Dublin about ten times unsuccessfully, and I have heard of others in the country in which it was undertaken ineffectually. Unfavourable results are seldom recorded.

We can now understand why the operation has been denounced by Portenschlag, Borsieri, Mercati, Dupuytren, Physick, Portal, Paré, De la Motte, Boyer, Heister, Boerhaave, Breschet, &c., and only wonder at the error of one of the writers of the British and Foreign Medical Review, who says, "Making allowance for the fallacy of medical testimony in wonderful cases, which we are fully inclined to do, we will estimate the successful cases at *one-third*, and ask if any other remedy in this disease has been equally fortunate?"[14] In abdominal dropsies, "it must be remembered that paracentesis can seldom be contemplated as a mode of cure, but simply of temporary relief from distress;"[15] "and although it should not be proscribed from practice," says Dr Copland,[16] "I believe the cases are few that will be benefited, and still fewer that will be cured by it."

In hydrocele of the *tunica vaginalis testis*, it is long since a radical cure of it has been attempted, by the inflammation produced by incision, excision, tents, setons, and injections; and if, in these two forms of dropsy, in which the containing parts naturally return to their proper position after the withdrawal of the fluid, a cure by its simple removal is so rare an occurrence, a reason is afforded us why dropsy of the brain, the parts of which cannot reassume their natural position or structure after the withdrawal of the fluid, is not to be cured by paracentesis of the head.

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[1] Dublin Medical Press, Vol. iv. p. 148. Ibid. Oct. 3, 1849.
[2] Medical Gazette, January 26, 1850.
[3] Ferguson's Surgery, p. 491.
[4] Ibidem.
[5] Memoires der Medecine. Paris, 1835.
[6] Œster. Medic. Jahrb. June 1846.
[7] Provincial Med. Journal, October 1845.
[8] System of Pract. Surgery, p. 491. Lond. 1847.
[9] Medical and Physical Journal, Vol. lviii. p. 44.
[10] Winslow's Journal, Vol. i. Monograph, p. 15.
[11] On the Structure and Functions of the Nerves, p. 15.
[12] Œster. Med. Wochenbl. November 1842.
[13] *Loc. cit.*
[14] British and Foreign Medical Review, Vol. xii. p. 119.
[15] Watson, *loc. cit.*, Vol. 5. p. 155.
[16] *Loc. cit.* p. 632.

To induce inflammation in the brain is death. The operation "is certainly one attended with considerable immediate danger, not from the puncture, which is a very simple matter, nor from the sudden escape of a fluid, nor from the wounding either a vessel or the brain, but from the inflammation likely to succeed."[*]

Dublin, 31 *Kildare Street.*

Art. IV.—*Interesting Cases occurring in the Practice of* James Stark, M.D., F.R.S.E., Fellow of the Royal College of Physicians of Edinburgh. (Continued from Vol. lxxiii., p. 395.)

IV.—*Symptoms of poisoning produced by Du Barry's Revalenta Arabica Food.*

Mr R., long an invalid from rheumatism, was induced to make trial of Du Barry's Revalenta Arabica food, from the use of which some of his friends had derived much relief. On the morning of the 30th October 1846, a small quantity was, therefore, prepared in the usual way, for breakfast, of which he partook, in bed, about a quarter after nine o'clock. He then, as was his wont, lay down, intending to rise and dress about ten. Very shortly after lying down he felt uneasy, with a singular sensation of debility creeping over him. His limbs appeared to get so heavy that he was unable to move them, accompanied at the same time with a somewhat tingling sensation in them. Getting alarmed, and being unable to reach the bell, he attempted to cry for assistance, but found his power of utterance was nearly gone, and the expression of his voice quite changed. His wife, however, had heard him, and though it was only a quarter of an hour since she had left him, could never have recognised him, so great was the change in his features and whole body. His natural appearance was spare, thin, rather shrivelled; now his face was swollen, his eyes prominent, the nose twice its natural size, the lips swollen and projecting like a negro's; the neck, hands, arms, limbs, and whole surface of body rapidly swelling, as if he had become suddenly dropsical, but the swelling equally diffused. His tongue, too, was enlarging, and impeding his utterance, and saliva flowed copiously from his mouth. He was so weak he could not turn or move, and lay as if insensible. Brandy was attempted to be poured down his throat; and as his feet and limbs were quite cold, hot bottles were applied to them.

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[*] Ferguson, loc. cit. p. 490.

I saw him a few minutes before ten o'clock, and found him still in the above-described state, with the surface cold, the expired breath cold, and the pulse at the wrist almost imperceptible. The œdematous swelling had continued to increase, pitted deeply on pressure, and was uniformly diffused over the trunk and limbs, but had distended all the cellular parts of the body, as eyelids, scrotum, lips, &c., to distension. The eyelids were so swollen, that the eyes were imperceptible; the lips were everted, and distended to the verge of bursting; and the tongue filled the whole cavity of the mouth, and projected considerably beyond the teeth. The face alone presented any appearance of redness; the rest of the body was pale. There was great difficulty of breathing, and evident uneasiness at stomach, but he was so weak, and unable to move hand or limb, and his power of utterance gone, that he could not express it. A sulphate of zinc emetic was instantly administered, which, though dissolved in only about half an ounce of water, was swallowed with very great difficulty. It had scarcely reached the stomach, when it caused the whole contents to be freely evacuated, with almost immediate relief to the breathing. The body was then rubbed with hot flannels, a large hot mustard poultice was laid on the stomach; and as soon as the vomiting had ceased, doses of sp. ammon. aromat. and brandy were given, till the pulse began to rise, and the temperature return to the body. With the increase of temperature and strength of the pulse, the power of motion returned,—the one keeping pace with the other. The œdematous swelling shortly after this began to abate, and the profuse salivation diminished, and finally stopped about five o'clock in the evening. Two days elapsed, however, before the œdema disappeared from the face; indeed, it was only carried away by acting freely on the bowels and kidneys, by means of the compound jalap powder with calomel, and using the solution of cream of tartar for ordinary drink. For several days after this attack the stomach remained irritable, and even the smallest quantities of food caused the formation of much flatulence and acidity. The redness was almost entirely confined to the face. All the other parts of the body, so long as the œdema persisted, were preternaturally pale, and presented no appearance whatever of increased redness.

What, it may be asked, was the nature of this complaint? At the first glance it appeared to be a new variety of erythema, rendered more than usually virulent, and more than usually general, from the Revalenta Arabica having acted as an irritant (?)

poison. On reflection, however, this view was abandoned as untenable, from the circumstance of the redness not being general, but confined to the head and face alone, while the rest of the body, though equally affected with the œdematous swelling, was wholly destitute of redness. Then again, erythema is never seen occurring over the whole body at once, but is confined to limited spots, which, though elevated and red, leave the skin in the neighbourhood of its natural aspect. Erythema, too, is generally preceded and attended by more or less heat, anorexia, and feverishness, while this case was attended with faintness, debility, and coldness.

These circumstances then forced on me the conclusion, that the disease was, in truth, a form of poisoning, produced by the irritation or absorption of poisonous matter from the Revalenta Arabica. And to this view all the symptoms corresponded. The faintness, debility, loss of power, failing of pulse, and rapid swelling of the body, all showed the presence of poisonous matter in the blood; and the sudden appearance of these symptoms, after partaking of this particular kind of food, showed that the poisonous matter was derived from it. It is true that I had never either read of or seen a case in which such sudden and great effusion of fluid into the subcutaneous cellular tissue was produced by such means; but the particular action of poisons on individuals is modified by so many causes, that we are not, on that account, to resist the conclusion, because we have not on record similar cases. That true poison can produce a precisely similar train of symptoms, the following case, which I accidentally witnessed in Lanarkshire, in 1835, will prove.

V.—*General Dropsy suddenly produced by the Sting of a Honey-Bee.*

J. R., a stout farmer, while watching his bees, in July 1835, which he expected to cast off a swarm, was stung by one of them on the eyebrow, immediately over the supra orbitar foramen. The moment he was stung he experienced an acute lancinating pain in the spot, as if the nerve had been punctured,—got deadly faint,—the perspiration burst from every pore,—and with very great difficulty he managed to reach the house, distant not twenty yards. When he arrived there he was so faint he had to lie down in bed, and sickness coming on, he once or twice vomited, without the sickness abating. After the vomiting his wife remarked his face, more especially the eyelids and lips, were greatly swollen; and the swelling increased so rapidly, that his eyes soon became invisible, and his lips were so swollen, tense, and everted, that they seemed on the point of giving way. The family getting alarmed, and knowing I was in the neighbourhood, sent for me, and I saw him within a quarter of an hour,—certainly not twenty minutes,—from the receipt of the sting. I found the whole body swollen, with watery effusion, pitting deeply on pressure. The face, which was fearfully swollen and disfigured, had a dark purple colour, apparently from congestion produced by imperfect respiration; the respiration was difficult and laboured; the pulse was very small, weak, and irregular; the heart's action tumultuous; the surface of the body and extremities cold. He was still sensible, but extremely weak, faint, and sick. Brandy was administered internally; hot whisky and water cloths applied to the site of the wound, which was painful, until sp. ammoniæ aromaticus was obtained, when it was substituted as an external application, as well as administered internally. The hartshorn application gave great relief to the wound, and appeared to have much more powerful restorative effects than the brandy. From the first dose he began to revive, and by the evening was able to sit up in bed and take a cup of tea. The general œdema had by this time much diminished, and by next morning was almost entirely removed from the body, but still continued about the brow, eyelids, and lips. The seat of the sting remained swollen and tender for a day or two.

This case is interesting, both from showing from how small a cause disagreeable and severe symptoms may arise, and also from throwing light on the nature of the symptoms produced in the former case by the use of Revalenta Arabica as food. This farmer had often been stung before both by bees and wasps; indeed, I have seen him stung severely with the latter while destroying their nests, yet no bad results followed. But in this case, from the moment of the puncture, poisonous symptoms were manifested, and the faintness, sense of sinking, and failure of the heart's action, were at one time so intense as to cause fears of sinking. The rapidity with which the general œdema appeared in both these cases, and the great similarity of the symptoms were the curious features to which the attention deserves more particularly to be directed. Symptoms of such severity suddenly making their appearance in the one case after the introduction of an extremely small quantity of animal poison into a wound, and in the other, from the introduction of a particular kind of food into the stomach, appear to throw mutual light on each other, and seem to indicate that in both cases the symptoms resulted from the circulation of poisonous matter in the blood. Why the sting of a bee should at one time cause such violent general symptoms, and the sting of many wasps or bees not cause anything but local symptoms at another time, is difficult to explain, unless on the supposition that the poison was in the one case introduced directly into the circulating fluid by the sting puncturing a blood-vessel, or by its more direct action on the nervous system by puncturing the supra-orbital nerve. As in the first case, however, the poisonous symptoms resulted from food, the poisonous matter from which would act through the circulation, and not through the nerves, the more probable supposition appears to be, that in both cases the poison operated primarily through the blood.

A very interesting subject of inquiry is suggested by these two cases. Whence came the large quantity of fluid which so rapidly distended the subcutaneous cellular substance? The rapidity of the swelling,—distending the skin of the whole body almost to the utmost it would bear in about half-an-hour,—puts an end to any supposition of part of the fluid being derived from the moisture in the air. Even allowing that the air breathed during that time was entirely deprived of moisture, the quantity breathed could not yield half an ounce of fluid; and as the function of the skin was greatly deranged by the œdematous swelling, we cannot allow it to have supplemented the vapour from the lungs even to the extent of another half-ounce. That the fluid was not furnished by any supply from the stomach is evident, in both cases, from this, that in the first case, the stomach was still full of the fluid breakfast, and yielded, after the administration of the emetic, a larger quantity than was swallowed at breakfast, after the swelling had gone its full length; while in the latter case the stomach rejected its contents before the swelling commenced. The only conclusion, therefore, is, that the whole of the fluid must have been derived from the blood; and though at first sight it would stagger one to believe that a spare thin body could furnish from its supply of blood sufficient watery fluid to cause the skin to be distended almost to bursting, there does not seem any reason to doubt its possibility. The body of a man is calculated to contain from 28 to 36 pounds of blood, of which about 78 parts in the 100 are water. If the blood, therefore, were suddenly to throw out the half of its watery particles into the cellular tissue, the quantity appears sufficient to produce the distension required; and the sudden loss of so large a proportion of circulating fluid would easily account for the sensation of sinking, faintness, and feebleness, or even imperceptible pulse noticed in both these cases.

VI.—*Case of over-driving in the human subject.*

J. W., a cattle driver, about thirty years of age, of herculean frame, was driving a herd of black cattle, on Monday, 22d October, when a few got enraged and broke loose. He greatly over-exerted himself in endeavouring to re-capture them, and was nearly two hours constantly on the run. His exertions were so great during this period, that he had frequently to sit down for some minutes to rest, and felt under the absolute necessity of partaking of spirits, to enable him to stand the fatigue he was obliged to undergo. By the time he had recovered the cattle he was so exhausted that he fell down, and was obliged to be sent home in a brougham. He was put to bed, and as by this time he was speechless, and the coachman who brought him could tell nothing about him, his friends imagined he was simply intoxicated, and thought no more about him. He passed a miserable, restless night, moaning most of it, as if in great agony. On the next day, Tuesday, as he was no better, his friends administered a dose of salts to him, which, however, he rejected by vomiting. This day his face began to assume a purple hue, his sufferings became greater, he moaned incessantly, talked incoherently, and slept none all that night; and by next morning (Wednesday) it was so apparent that he was dangerously ill, that I was sent for.

I found him lying on his back, moaning with agony; his head and shoulders raised high with pillows, to relieve the excessive difficulty of breathing; and he could not bear even the weight of the bed-clothes over the chest. The heat of the body was higher than natural; the face and upper portion of the chest of an almost crimson colour; the pain in chest and upper portion of abdomen was exceedingly severe and constant. The pulse was hard and full, about 170 in the minute, accompanied with tumultuous action of the heart. The breathing was short and difficult, varying from fifty to fifty-six inspirations in the minute, and attended with an incessant short hacking cough, with bloody sputa. The chest was dull on percussion, particularly in the lower parts, and the crepitous rattle was general over it. Over all the lower parts, however, it was quite apparent that condensation or hepatization had already taken place, as no murmur of any kind could be heard over it, but what was transmitted from the larger bronchi. The bowels had been moved that morning, when a large quantity of fœtid feculent matters were passed, deeply coloured with blood. The breathing was entirely abdominal, the slightest motion of the ribs fearfully increasing the pain. The eyes were red and injected; the tongue covered with a thick, white fur. He had headach, and pains over all the body and limbs. The secretion of urine was nearly arrested; within twenty-four hours he had only passed about a wine-glassful of a deep red fluid, nearly half of which was blood. Though he answered questions sensibly, he was no sooner left alone than he began to rave, and talked incessantly. He was supported in bed in the sitting posture, and blood was drawn from a vein in the arm till faintness was produced. About a pint and a half of blood was drawn, and such blood I have never seen before or since. Ten minutes after the blood was drawn it had not coagulated, but the whole red particles had separated and fallen to the bottom, leaving about three-fourths of the blood a nearly colourless serous-like fluid. This was poured off from the red particles into a separate vessel, where, in a short time, it separated into a clot of fibrin, and a quantity of pure serum. The fibrinous matter had been so thoroughly separated from the red particles, that they did not form a clot at all, but remained fluid as at first. I was unfortunately so busy at the time, that I had not leisure to examine the blood more minutely, either chemically or microscopically, which is much to be regretted, as such an opportunity may not again occur.

The blood-letting relieved the severity of the pain considerably; and as it appeared that his only chance of recovery depended on bringing the system rapidly under the influence of mercury, five grains of calomel, with sixty minims of laudanum, were administered immediately; and he was directed to take one grain of calomel every second hour, and twenty drops of laudanum every third hour, till the pain in the chest was abated. A blister was also applied over the lower part of the chest.

25th Oct. It was found he had passed a wretched night, raving most of it. The cough continued incessant, with bloody sputa, and blood tinged all the secretions, urine, fæces, and even the mucus from the nose and mouth. The breathing was still short and quick, about fifty inspirations in the minute; and the pulse 160, somewhat full, but with a particular jerk, and compressible. The urine he passed amounted to about a teacupful in twenty-four hours, and deposited a considerable quantity of blood; and the feculent discharges consisted almost entirely of pure blood and mucus. He raved and moaned almost incessantly, but was sensible when spoken to. He had great thirst, and complained of the excessive pain across the lower ribs, more especially over the region of the liver. The blister had not risen well, so a large mustard poultice was applied to the side, but not over the site of the blister. Calomel was continued in the same doses; but the laudanum was increased to thirty drops every three hours.

26th Oct. No improvement; no change for the better. Blood still colouring all the secretions. He had little or no sleep, with constant moaning and delirium. His sufferings were so great, that even sixty drops of laudanum at a dose gave very little, and that only temporary, relief. By the evening his gums were slightly affected by the calomel, but no sensible improvement had taken place. The medicines were continued, hot fomentations to the bowels being, in addition, resorted to.

27th Oct. This day he was seen in consultation with Dr Scott. The same dulness on percussion of the lower parts of the chest. The same absence of respiratory murmur there. The same crepitous and mucous rattles over the upper portions of the chest.

The same tumultuous action of the heart, quickness of pulse, and rapidity of respiration continued. The sputa and all secretions were still tinged with blood, though scarcely to the same amount as on the 26th. The pain across the lower ribs, extending over the upper portions of abdomen, and more especially over the region of the liver, continued nearly as before. The urine was somewhat increased in quantity, but was still slightly tinged with blood, as before. As Dr Scott took the same view of the disease that I did, and approved of the treatment adopted, no change in it was made, more especially as the mercury appeared to be beginning to affect the system. A blister, however, was applied again over the region of the liver.

28th Oct. The blister had risen partially. The mercury had now fairly affected the mouth. The gums were tender and spongy, and slight salivation was induced. He had had a *bilious* stool, only very slightly tinged with blood, and the urine, though still scanty and high-coloured, only deposited a few red globules of blood. The nasal mucus, however, was not now tinged with blood, and the mucous sputa were only slightly reddened. He had dozed occasionally during the night, but still raved incoherently when left alone, and moaned incessantly, but was sensible when spoken to. The crimson flush of the face and upper part of the chest had now greatly disappeared. What remained had assumed more of a leaden hue. The pulse now fell to 120, and was very feeble; and debility was so great he could not turn himself in bed. He still complained of slight headach and general pains over the body and limbs, the pain of the chest giving him by far the greatest annoyance. He was allowed a little whisky along with his laudanum every third hour, and the calomel powders were only given every fourth hour. A stimulant embrocation was also applied to the chest and abdomen.

By the 3d of November the pulse ranged from 96 to 104, and the respirations were still quite short, about 30 in the minute, and abdominal. The sputa were no longer tinged with blood, or only occasionally so, nor any of the secretions. Slight uneasiness was still experienced in the chest and upper portion of the abdomen. Nearly a third, however, of the lower portion of the lungs remained at this date condensed and impermeable to air. He had still considerable cough, with pretty copious mucous sputa. Still had restless nights, with little sleep, excepting when procured by means of laudanum, and was then much disturbed by frightful dreams, and had still occasionally slight delirium. Though the bowels were freely opened, they began to be distended with flatulence, and he experienced much relief from occasional doses of sp. ammon. aromat. with sp. lavend. comp.

By the 10th of November, the respirations had diminished to

24 in the minute, but the pulse was never below 90. The calomel had been discontinued for some days, and the laudanum was only given at night. Symptoms of sinking, however, manifested themselves during the night. Restlessness, jactitation of the arms, *subsultus tendinum*, inability to retain his urine, an almost imperceptible pulse, and muttering delirium came on, attended by excessive perspiration, which drenched his night clothes faster than they could be changed. The stimulant (whisky with sal volatile and sp. lavend. comp.) was increased to a table spoonful every hour, and he was given every second hour two grains of sulphate of quinine with twenty minims of dilute sulphuric acid, which was desired to be continued till the sweating was checked. The third dose of the quinine effectually checked the sweating, sense of sinking, subsultus, &c., after which he fell into a tolerably quiet slumber, from which he awoke much refreshed.

From this date he slowly recovered without any further check. He was able to sit up in bed on the 28th November, but did not venture out of it till the 5th of December. At this latter period he had still some cough with clear mucous sputa. The lower portion of the chest was still dull on percussion, and the lung there impermeable to air; but this portion had diminished considerably during the last fortnight; the lung was evidently recovering itself. The pulse was still very feeble, 80 to 86 in the minute; respirations 20 in the minute. The bowels were regular, and his appetite returning. He was taking nourishing food, quinine and iron daily, and applying a stimulant embrocation to the chest.

By the end of January, no dulness on percussion could be detected over the chest, and faint respiratory murmur was heard over all those portions of the lungs which had been condensed. He had regained much of the flesh he had lost, but his chest had not recovered its former diameter. He still felt weak and unable for work; was easily heated and fatigued under exercise. His cough had almost entirely left him, and he never expectorated excepting a very little in the mornings on rising.

By the end of February he had completely recovered his health and strength, and was able to return to the severe labours of cattle-driving. His chest was now clear all over; the respiratory murmur natural; respiration full and deep, 10 in the minute; pulse 45, strong and regular.

This case, though mainly severe inflammation of the lungs, had those other features which took it out of that category, and induced me to term it what it really was, a case of over-driving in the human subject. It is a known fact, that when cattle are overdriven, they fall rapid victims to inflammatory action of the lungs, liver, kidney, bowels, &c.,—in fact of all organs of the body. The inflammatory action is so rapidly fatal to them, that experience has taught the cattle merchant the only way to secure the value of the animal is to slaughter it immediately. In this case, the blood is remarked to have almost entirely lost its coagulating power, and to be so infiltered, as it were, into the substance of the flesh, that the animal does not bleed so freely as usual, and the flesh remains deeply tinged with the blood, which oozes out from it on every fresh cut made into it, and rapidly runs to putrefaction.

Precisely analogous was this case. There was evidently inflammatory action going on in every organ of the body. The lungs, the liver, the kidneys, the bowels, the brain, were all more or less severely affected, and the fluid, dissolved or non-coagulating condition of the blood was not only proved by the inspection of the blood drawn from the vein, but by the circumstance that the whole secretions of the body, even the nasal mucus, were deeply tinged with blood.

The case is still more interesting, from the circumstance of the man recovering perfectly from such a severe affection, attended by such acute and long protracted suffering. For several days, there appeared not the slightest hope that he could recover.

(*To be continued.*)

Art. V.—*On the Influence of the Climate of New Zealand in the production of Disease among Emigrants from Great Britain.* By Arthur S. Thomson, M.D., Surgeon 58th Regiment.

Seventy years ago Captain Cook described the climate of New Zealand as one peculiarly healthy. The missionaries, who thirty years back undertook the honourable but dangerous duties of christianizing and civilizing the natives, confirmed the opinion of the great navigator. Since the establishment of the New Zealand Company in 1840, and the British Government in 1841, the European settlers have been constantly writing to their friends in England about the salubrity of the climate, and the fertility of the soil; but as all these statements are apparently founded on common report without any accurate statistical data, I have thought it might be useful to give some definite information about the diseases of a country which, I have no doubt, in future years will prove to Great Britain a most useful colony, and a settlement, if well conducted, which will have much influence in extending the blessings of Christianity and civilization over the numerous, beautiful, and populous islands scattered about the Southern ocean.

To my friend, Staff-Surgeon Courtenay, Principal Medical Officer in New Zealand, I am indebted for the materials on which this memoir is founded. The results are obtained from observations drawn from the military population, a source not only of great accuracy, but highly advantageous for such inquiries, from the circumstance that an easy means of comparison is afforded with men similarly situated at home.

On the length of time Troops have been quartered in New Zealand.—During the year 1836, a detachment of troops was sent from Sydney to the west coast of New Zealand, to revenge the murder of a ship's crew by the natives, but the soldiers were not detained for any length of time on shore. In the year 1841, on the arrival of Captain Stobson, the first Governor of New Zealand, at Auckland, he was accompanied by a company of the 80th Regiment, which was afterwards relieved by another detachment of troops; and in 1845, when John Heki declared war by the destruction of Kororarika, about two hundred men constituted the military population of New Zealand. After this year, and up to the present time, a large portion of two regiments, with a small detachment of artillery and sappers, have been kept as a garrison for the country.

The period over which the following observations extend.—Although it will be seen, from the foregoing sketch, that the troops have been exposed to the climate of New Zealand for several years, I shall, however, confine my observations to the year ending March 1849, because almost all the soldiers during that period have been resident in New Zealand for upwards of two years; and the diseases which prevailed among them must, with some exceptions, be referred, not to the previous country they were employed at, but to the climate of New Zealand.

On the Strength of the Troops.—Statement, showing the average strength of the military population in New Zealand, for the year ending March 1849.

Corps.	Officers.	Men.	Women.	Children.
Royal S. and Miners	3	13	3	8
Royal Artillery	2	24	4	8
58th Foot	29	881	105	198
65th Foot	32	1001	107	210
Total	66	1919	219	424

The distribution of the Force.—I have annexed an outline of the New Zealand group of islands, from which it will be seen how remarkably like a boot they are in shape; the point of the boot being at the north cape. The military are confined to the

North Island, no troops during the year having been quartered either at Nelson or Otago, which settlements are in the Middle Island.

At Auckland there were quartered .	630 men.
At the Bay of Islands .	190 ,,
At Wellington and its neighbourhood	729 ,,
At Wangannie	370 ,,

Auckland is the seat of the Colonial Government. It was founded in 1841. It is situated on a part of the island which is only six miles broad. According to the census of 1848, Auckland and the neighbouring districts contained a population of 7003 souls. The town is surrounded by a large native population, and the situation affords an approach by water in many directions. The harbour on the west coast opposite Sydney is not a safe one, but the harbour on the east coast is distinguished for safety and deep water; a great part of the town is built of wood.

Bay of Islands.—This beautiful place, on the east coast, is situated at the northern extremity of the North Island. Previous to the arrival of the British government, it was the favourite resort of a large proportion of the whaling ships in the southern ocean. In 1845, Kororarika was burned to the ground by the natives, and since then it has never regained its former position. It is in the neighbourhood of that celebrated chief, John Heki, who is now quiet, sensible himself, and if not, his followers are, of the advantage of having civilized men among them.

The Bay is distant from Auckland about a hundred miles. Small vessels are constantly passing between the two places, and 24 hours is often the duration of the voyage. The European population in the neighbourhood is now very small.

Wellington.—This town is placed at the southern extremity of the North Island; it was established in 1839 by the New Zealand Company. The harbour is very good. During the month of October 1848, several severe shocks of earthquake were felt, which did considerable injury to stone and brick buildings. Wellington is the seat of the Lieutenant-Governor of New Zealand, and has a European population of about two or three thousand souls.

Wangannie or Petre is a settlement on the West Coast of the island on a river of the same name. It is five miles from the sea coast. The river opposite the settlement is 250 yards broad. There are about 150 houses and a church. Before the outbreak of the natives in 1847, it was more flourishing than at present; the European population is small, but increasing.

On the amount of mortality which occurred among the troops from disease.—Out of 1919 men, 19 died from disease, which gives a ratio of deaths of ten men per thousand. Among troops quartered in Great Britain, the average annual mortality is fifteen men per thousand. During the same year, out of 219 women, 59 applied for medical aid, and 2 died; 1 from uterine hæmorrhage, and the other from consumption. Out of 424 children, 113 were treated and 9 died, or 2½ per cent. The cases which proved fatal were all young, and the fatal diseases were, of fever, 1 catarrh, 2 hydrocephalus, 1 tabes, 2 bowel complaints, of scarlet fever.

The nature of the diseases which occurred and produced the deaths.—For the sake of comparison and brevity, I have drawn up the following numerical statement.

Table showing the annual ratio of admissions into hospital from different classes of diseases out of a thousand soldiers stationed in Great Britain, and the ratio of admissions which occured from the same diseases among the troops quartered in New Zealand, for the year ending March 1849.

Annual number of admissions into hospital out of a thousand soldiers serving, 1849, in—

Diseases.	Great Britain.	New Zealand.
Fevers	75	10
Eruptive Fevers	3	0
Disease of the Lungs	148	56
„ Stomach & Bowels	94	55
„ Liver	8	4
„ Brain	6	6
Dropsies	1	4
Rheumatic affections	50	41
Venereal „	181	24
Abscesses and Ulcers	133	81
Wounds and Injuries	126	86
Diseases of the Eyes	19	34
„ Skin	23	8
All other diseases	44	31
Total	921	440

I will now make a few observations on the prevalence of each class of disease. But, before doing so, I must call attention to the fact shown so well in the foregoing table, namely, that out of a thousand troops quartered in Great Britain, 921 men are annually admitted into hospital, in consequence of disease; whereas in New Zealand, during the year under observation, the ratio of men admitted into hospital was only 440, or about one-half less than in England.

Fevers.—It will be seen from the foregoing table, that this class of diseases is very rare among the troops in New Zealand. The fevers of soldiers in a temperate climate are generally slight, and are often produced by intemperance in drinking.

Thus the average duration of each case treated in New Zealand was only seven days. One man died, out of nineteen cases of fever treated. The fatal attack occurred at Auckland, where, in the autumn months of the year, a few severe cases of a peculiar form of fever have occasionally occurred. The cases are characterised by a low state, and the mental faculties are oppressed. This produces a state of insensibility to pain, and, in consequence, fatal complications are often obscured, or totally overlooked, until a *post mortem* examination is made. The abdominal viscera are most liable to be affected.

Although some few cases of ague have occurred among the troops employed on service in the bush, yet that disease is almost unknown, either at Auckland or Wellington.

Eruptive Fevers.—No case of this class of maladies occurred among the troops, although during the year 1848, scarlet fever, for the first time, made its appearance in Auckland, and proved fatal to 18 children, out of 146 attacked. Small pox has not yet appeared in New Zealand; but two cases of varicella occurred in Auckland, in June 1848, and many cases of the same disease at Wellington, in December 1848.

Disease of the Lungs.—It will be seen, on reference to the above table, that the admissions from this fatal class of diseases were one-third less numerous than among the troops quartered in Great Britain. This is an important fact, and one which is worthy of the most careful observation.

No. 1.—The following table will show the admissions to hospital, during the year ending March 1849, among the troops quartered in New Zealand, on account of pectoral diseases :—

Diseases.	Remaining sick on 31st March 1848.	Admitted during year ending March 1849.	Total.	Discharged	Died.	Left under treatment.
Pneumonia	...	10	10	5	1	4
Pleuritis	...	3	3	3	...	...
Bronchitis chron.	...	1	1	0	...	1
Hæmoptysis......	...	3	3	3	...	...
Phthisis Pul. ...	1	11	12	2	10	...
Catarrh acut. ...	...	44	44	41	...	3
„ chronic.	3	32	35	30	...	5
Dyspnœa Con....	1	3	4	4	...	...
Total.........	5	107	112	88	11	13

Among the troops serving in Great Britain, the annual ratio of deaths, from diseases of the lungs, is eight men per thousand; whereas among the troops in New Zealand last year, the ratio of mortality from pectoral diseases was 5¾ per 1000; and out of 219 women, only one died during the year from consumption.

There are fewer admissions from this class of diseases among the troops in the south part of the island, than in the north; but the proportion of deaths is the same in both places; and as the men are often discharged and re-admitted, from pectoral diseases, no great reliance can be placed on the number of admissions, unless there is a disparity in the deaths.

It has been observed, that the native race are very subject to consumption, and on that account the climate has, by some of the English settlers, been said to be productive of this class of diseases; an opinion which the above results contradict.

"The climate of New Zealand," observes Surgeon Pendergast of the 65th Regiment, "is peculiarly favourable towards the non-development of pulmonary affections, and in the majority of the fatal cases the seeds of disease existed before their arrival in New Zealand. Among the five fatal cases in the 58th Regiment, the symptoms of consumption had been observed in three of them before their arrival in New Zealand."

The following is an abstract of the ten fatal cases of consumption which occurred among the troops serving in New Zealand during the year ending March 1849.

Private Wm. Pearson, aged 24; served two years and four months, of which one year and five months were in New Zealand. —Numerous crude and miliary tubercles in both upper lobes, with cavities.

Private T. M'Cluney, aged 32; served seventeen years and one month, of which one year and ten months were in New Zealand.—The whole structure of both superior lobes presented a mass of disease, being occupied by cavities in various stages, containing purulent matter.

Private J. Donohoe, aged 35; served thirteen years and ten months, of which three months were in New Zealand.—Right lung, excepting its inferior lobe, a mass of tubercles, with small cavities; upper lobe of left lung contained tubercles in different stages.

Private J. Gilligan, aged 21; served two years and eleven months, of which one year and eight months were in New Zealand. —Often in hospital with catarrh. Before death he was forty days in hospital. Superior lobe of right lung studded with tubercles, in the upper part of which there was a cavity. The left lung had nearly disappeared; only its cellular substance remained.

Private Pat. Moore, aged 22; served three years and three months, of which two years and three months were in New Zealand.—On his arrival in New Zealand he had cough and undoubted symptoms of phthisis. Tubercles in both the upper lobes, with several small cavities.

Private Edw. Guest, aged 38; served seventeen years, of which two years were in New Zealand.—Had been under treatment for pectoral disease before arrival in New Zealand, and in New Zealand was for two years unable to perform his duty. He was so emaciated, that on his last admission he only weighed ninety-six pounds. Both lungs extensively diseased; tubercles in different stages.

L.-Sergt. J. Dowling, aged 27; served six years and six months, of which four years were in New Zealand.—When on voyage out to New Zealand, in 1843, he first showed symptoms of pulmonary disease; after this he was often in hospital with catarrhal complaints, On examination of the body, the right lung was pretty free from tubercles, but the left was one large cavity.

Private Jas. Mitchell, aged 26; served eight years, three years of which were in New Zealand.—In April 1848 he was first attacked with cough and dyspnœa. The disease ran a rapid course, death occurring in December 1848. In the right lung there was a large cavity, and the substance was infiltrated with tubercles. Left lung filled with tubercles in different stages.

Private J. Bevan, aged 24; served nine years, four of which were in New Zealand.—In 1842, when in England, he was under treatment for pulmonary disease, and even it was a question whether he should embark with his regiment. On his arrival in New South Wales and New Zealand he improved, but death occurred, and both lungs contained tubercles and cavities.

Private J. Buick, aged 22; served three years and six months, two years of which were in New Zealand.—Often in hospital with acute catarrh previous to the fatal attack. The right lung was one mass of tubercles in different stages. Left lung in a similar state, with the exception of one lobe. He was subject to epilepsy.

From a glance at the post mortem appearances in the fatal cases, it will be seen how very extensively the lungs have been affected. Consumption in New Zealand is often arrested in its progress, but sometimes the disease seems to run its course rapidly towards a fatal termination.

Professor Guy of King's College, states that the mean duration of consumption is two years; consequently several of the men must clearly have been suffering from the disease before their arrival in New Zealand; and I have little doubt, from what I have observed of the 58th Regiment, during the third year of their residence in New Zealand, that the next annual ratio of deaths from consumption will be below 5¾ deaths per 1000.

Subjoined is a return of the annual proportion of deaths by diseases of the lungs per 1000 living among troops serving in different climates :—[†]

States.	Annual Mortality per 1000 from all Diseases.	Annual Mortality by Diseases of the Lungs per 1000.
Malta,	18	6.
Ionian Islands,	28	4·8
Bermuda,	30	8·7
Canada,	20	6·7
Gibraltar,	22	5·3
Cape of Good Hope,	15	3·8
Mauritius,	30	5·6
United Kingdom,	15	8·
New Zealand,	10	5·7

An examination of the Table No. I. will show that, with the exception of dropsies, diseases of the eyes, and rheumatisms, no class of maladies has produced a greater amount of sickness than in England. The climate of New Zealand is so mild, that a low chronic state of disease is produced ; the kidneys, heart, and other organs become affected, and dropsical effusions result.*

It will be seen that venereal affections are rare. This disease, although introduced among the natives of New Zealand many years ago by the seamen of Captain Cook, and subsequently by the crews of various whaling vessels, does not appear to be very prevalent at any of the stations where the troops have been stationed, if any inference may be drawn from the small number of soldiers afflicted with this disease. I have examined the register of the diseases, for which natives applied for treatment at the Colonial Hospital at Auckland, and find that, out of 163 patients male and female, six had venereal affections.

The elements of the climate of New Zealand.—During the year ending July 1849, I kept a careful register of the weather at Auckland, and from this table a very good idea may be formed of the elements of the climate.

It will be seen that the observations made at Auckland support the opinion that the mean temperature of the southern hemisphere is lower than that of the northern, although not to the extent laid down by Baron Humboldt. Thus, Gibraltar and Malta, placed in similar latitudes to Auckland, have a mean annual temperature 10° and 8° degrees higher, while Rome and Montpelier, in latitudes 41° and 43°, have a mean temperature similar to that of Auckland. As, however, the observations of Captains Scoresby and Weddell tend to show that this supposed difference in the temperature of both hemispheres does not exist in the *open sea*, the observations made at Auckland (a truly oceanic climate in almost every respect) will furnish data for comparison with the temperature at the Western Islands, and corresponding places in the northern hemisphere.

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* The Statistical Companion, 1848, by T. Banfield and C. R. Wild.

† Results obtained from the Military Statistics.

At Auckland the number of days on which rain falls will be found greater, I think, than at the other parts of the North Island. This result is produced by the narrow neck of land on which the town is situated, for I spent a part of the months of August and September 1849, in the interior of the North Island, and although I saw ice a quarter of an inch thick, and hoar frost on several occasions during the night, yet I experienced few wet days, compared with what occurred in Auckland during the same period.

The following table will show a few of the elements of the climate, at three different places in the North Island of New Zealand, for the years ending March 1849, and July 1849, and the average which occurs in London :—

Places.	Latitude.	Mean temperature of the year.	Mean temperature of		Aqueous vapour.	Mean Barometer.	Quantity of rain. Inches, 100.	Number of days on which more or less rain fell.
			Warmest month.	Coldest month.				
London,[*]	N. 51·30	49	62	36	5·5	29·93	20[‖]	153
Bay of Islands,[†]	S. 31·15	64	75	55	...	...	...	99
Auckland,[‡]	S. 36·51	59	69	51	4·5	29·92	51·84	179
Wellington,[§]	S. 41·22	58	70	48	...	29·99	54·33	115

It is obvious, from the above return, that the North Island of New Zealand has a climate, the mean temperature of which is higher, the range of the thermometer is less, and the moisture suspended in the air is greater in quantity than in England. To this evenness of temperature, and moisture in the atmosphere in New Zealand, may be attributed the favourable nature of the climate for the non-development of pulmonary consumption, and the small ratio of deaths which has been found to occur from this disease among the military population stationed in the North Islands.

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[*] Taken from the average of ten years, published in the Statistical Companion for the year 1848.

[†] For the year ending March 1849, forwarded to me by Staff-Assistant Surgeon Robertson.

[‡] For the year ending July 1849. Kept by myself.

[§] For the year ending March 1849. Kept by Surgeon Pendergast, 65th Regiment.

[‖] The average fall of rain in the united kingdom is about 34 inches, but in the western or hilly counties it is 48 or 50 inches.

Meteorological Table kept at Auckland, New Zealand, for the year ending July 1849, 30 feet above the level of the sea.

Months.	Greatest heat in shade, during the month	Greatest cold during the month.	Mean temperature.	Average daily range of temperature.	Power of Solar Rays.		Aqueous vapour on the application of water to the bulb of a thermometer covered with muslin, the temperature fell on a mean of three observations daily.	Number of days on which rain fell.	Barometer corrected to 32 Fahrenheit.			Quantity of rain. Inches, 100.
					Mean.	Greatest.			Highest.	Lowest.	Mean.	
January, ...	88	49	67	17	99	122	7·0°	8	30·11	29·74	29·92	0·65
February, ...	89	50	69	17	105	124	6	9	30·33	29·17	29·90	8·24
March, ...	80	47	63·6	16½	89	114	5·2	11	30·07	29·60	29·87	2·99
April, ...	81	48	63·2	14·5	87	103	3·5	10	30 23	29·45	29·94	4·88
May, ...	74	45	56.9	13	82	95	3·5	19	30·37	29·20	29·78	3·29
June, ...	68	35	51·4	15	73	85	3·0	19	30·15	29·44	29·89	3·28
July, ...	68	33	51	14	75	90	2·1	28	30·13	29·34	29·94	7·96
August, ...	66	36	51·8	12·5	78	90	2·6	16	30·28	29·37	29·83	6·45
September, ...	67	37	51·5	13·1	85	100	3·8	23	30·20	29·13	29·65	4·45
October, ...	77	37	57·3	15·2	88	112	5·0	15	30·34	28·96	29·61	3·43
November, ...	77	50	62·1	13·3	97	110	5·0	16	29·99	29·5	29·81	4·78
December, ...	79	49	66	17	101	114	7·5	5	30 08	29·65	29·87	1·44
Total and mean,	89	33	59·2	14	87	124	4·5	179	30·37	28·96	29·92	51·84

A Self-registering Thermometer was used for the extreme temperatures. The mean temperature was drawn from four observations daily. The barometer, during the year, indicated the least pressure on the 18th October 1848, the day on which the severe shock of an earthquake was felt at Wellington. The two barometers in my possession gave the same indication on this day.

A. S. Thomson, M. D.

Auckland, New Zealand, November 10, 1849.

ART. VI—*On the Minute Anatomy of the Lung of the Bird, considered chiefly in relation to the Structures with which the Air is in contact whilst traversing the ultimate subdivisions of the Air-Passages.* By G. RAINEY, M.R.C.S., Demonstrator of Anatomy at St. Thomas's Hospital. (Communicated by Dr TODD.) (Medico-Chirurgical Transactions, Vol. xxxii., p. 47, 1849.)

A DIFFERENCE in structure between the membrane lining the bronchial tubes, and that lining the air-cells of the lungs, has long since been inferred and insisted upon by Dr Addison and others purely from pathological considerations; but, prior to the communication of a paper of mine, upon the Minute Structure of the Lungs, to the Royal Medical and Surgical Society in 1845, I believe no direct proof that there is a decided difference in the structure of these parts had been advanced; that is, it had not been shown that the membrane and epithelium which line the bronchial tubes are not present also in the air-cells.

Notwithstanding the facts adduced in my paper, and the facility which the examination of lungs, recently and properly injected, affords, in determining the precise structure of the walls of the air-cells, and in proving, so far as a negative question is susceptible of proof, that they are destitute of a lining of epithelium, it is still maintained by some authors that the air-cells are lined with ciliated epithelium. The demonstration of this supposed fact has been attempted by filling the air-passages with tallow or size, and then submitting the lung thus treated, and the casts taken from the air-cells, to examination with the microscope. I may observe that all the ramifications of the bronchial tubes have a very complete lining of ciliated epithelium, which, by such a mode of preparation, might easily have been detached and broken up, and fragments of it forced into the air-cells; hence such a mode of procedure seems ill calculated to determine a point of so much delicacy. I am ready to admit that corpuscles of various kinds may occasionally be found in the air-cells, but these have not the most remote resemblance either in their quantity or manner of arrangement to a lining of epithelium, especially of that kind which is called ciliated epithelium. Mr. Addison was the first who described an epithelium lining the air-cells, which he states to be in the form of round nucleated scales, with from one to fifteen or more nuclei observable in a single scale.* It is very evident from this description that Mr. Addison must have mistaken the nuclei in the coat of the capillaries for an epithelium, an error which it is very easy to commit in examining the uninjected lungs, and which error can only be corrected by comparing the lungs uninjected with those in which the capillaries have been filled with injection. I have frequently seen the curve formed by a capillary projecting beyond the free border of the pulmonary membrane, where it forms a communication with an adjoining cell, presenting so much the appearance of a delicate epithelium, that, had I not more than once seen a vessel in a similar situation in the injected lung, I might have mistaken it for a portion of epithelium lining an air-cell, and considered that the air-cells have a lining, if not of ciliated, yet of pavement, epithelium, as some anatomists of the present day imagine.

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* Philosophical Transactions, 1842, Part ii., p. 162. Edin. Med. and Surgical Journal, Vol. lxix., p. 202, 203, 204. January 1848.

Notwithstanding, however, all that has yet been advanced on both sides concerning the presence or absence of an epithelial lining to the air-cells, this subject will probably be considered by many as undecided, and as requiring further confirmation. I am convinced this circumstance, even in the present state of the discussion, is not due to a deficiency of evidence on the negative side of the question, but to the difficulty which there always is in supporting a negative position against a positive one; the arguments in defence of the former being necessarily indirect and rational, and frequently deducible only from laborious observations and difficult experiments, whilst mere assertions, resting sometimes only upon the credit of the person who makes them, are all that is necessary to support the latter. But fortunately this is one of those questions which, if it cannot be determined in one class of animals, admits of being decided by an examination of the structure of the lungs in another class; furnishing an example of the advantage of comparative anatomy in leading to a clear comprehension of the structure of organs, which, in their pathological and physiological interest, must be classed among the most important in the body; and it is with this view that I have extended my inquiry to the minute anatomy of the lung of the bird and inferior mammals, to be considered chiefly in relation to the structures with which the air is in contact whilst traversing the ultimate subdivisions of the air-passages.

The respiratory apparatus in birds, as in mammals, consists of trachea, bronchi, intercellular passages, and air-cells. The trachea is made up of a series of rings, incomplete posteriorly, and connected together by an extremely elastic membrane: besides this membrane there are, in mammals, fibres connecting these cartilages, said to be muscular, but of the unstriped kind. In birds, the trachea is almost entirely surrounded by muscular fibres, but of the striped variety. These fibres are strongest along the sides and posterior part of the trachea; they do not extend entirely to the median line behind, but in front a thin layer goes completely across from one side of it to the other; they extend along the whole length of the trachea, but are not continued upon the bronchial tubes. The bronchial tubes in birds are membranous passages surrounded by the air-cells, traversing the lungs in various directions, and communicating freely with one another; their calibre is much more uniform than are the bronchial tubes of mammals, and the intercellular passages are very small, and given off at right angles with their axis, chiefly from their sides, instead of being continued from their extremities as in mammals. These peculiarities are rendered necessary in birds, by the additional function which these tubes have to perform, of conducting air from the lungs into the air-sacs and interior of the bones.

The bronchial tubes in birds are lined by a distinct fibrous membrane, similar in appearance to that lining these passages in mammals; and at those parts of the tube from which the intercellular passages proceed, this membrane is perforated, so that the bronchial membrane, like that in the human lung, does not extend further than the bronchial tubes.

The intercellular passages, as before observed, are small and very numerous, and proceed from the entire circumference of the bronchial tubes, at right angles with their axis. They very soon lose themselves, becoming more and more minute; among the air-cells they have no apparent membranous lining.

The air-cells are situated all around the bronchial tubes, filling up the interval between them and the spaces which separate the lobules; the interlobular fissures appearing, in the uninjected lung, to be merely the cellular walls of these passages. These cells, consisting almost entirely of blood-vessels, present a reddish colour; hence birds have been said by some physiologists to have fleshy lungs.

Although I have called these air-cells, because they receive and retain the inspired air, and therefore correspond in office to the small cavities which in mammals have received this name, yet I may observe, that the ultimate form of the air-passages in birds is not that of cells as in the human lung. The capillaries, instead of being connected together by a membrane, and placed several of them upon the same plane, and these planes of vessels so disposed towards one another as to divide the interior of the lung in square or polyhedral spaces, form by their frequent anastomoses upon different planes, and without any membrane connecting them excepting those capillaries which are situated nearest to the surface of the lobules, a kind of dense solid plexus, with no other separation between its vessels than the open areolæ or meshes of the plexus which communicate freely through the whole of a lobule. If a lung be examined by the microscope immediately after having been injected, globules of air are seen occupying the spaces between the capillaries. These globules are of various sizes, according to the dimensions of the areola in which they are situated. Some of those areolæ are exquisitely minute; they are generally smaller than the diameter of the capillaries by which they are enclosed, their diameter averaging about $\frac{1}{9600}$ of an inch.

These several structures have an investment of cellular tissue more or less complete, by which an entire lung is divided into lobules, as in the lung of the mammal. These lobules are generally distinguished in the bird by their great length, giving the exterior of the lung a convoluted appearance, not unlike that presented by the surface of the cerebrum.

Besides the vascular and membranous constituents of the lung already described, there is another, namely, the epithelium, which requires to be noticed. It was stated that the membrane lining the bronchial tubes does not extend into the intercellular passages, but terminates by a distinct circular border at the commencement of these passages from the tubes, giving the membrane in this situation a cribriform appearance. Neither does the ciliated epithelium lining the bronchial tubes extend into the intercellular passages, and from thence into the air-cells, or rather air-spaces, but it ceases where the bronchial membrane terminates. In the mammal, but especially in man, in whom the air-cells are very large, the fact of their having no epithelial lining can only be proved by a careful examination of the parts with the microscope; and, therefore, with no other means than these of deciding this question, it might always remain *sub judice*, so long as persons are found who are more ready to confide in the assertions of others, than submit to the pains and difficulty of examining the point for themselves.

The evidence furnished by a reference to the anatomy of the bird's lung is, however, of a more satisfactory kind, and more susceptible of a rational proof. It has been observed that the atmospheric air which enters the bird's lungs, is not received into regularly formed cells, but that it passes into minute interstices between the vessels, the average diameter of which is about $\frac{1}{9600}$ of an inch, and some are even smaller. Now, each epithelial cell which lines the bronchial tubes of a pigeon, I found by measurement to be $\frac{1}{800}$ of an inch in length, and about $\frac{1}{3300}$ of an inch in breadth, so that a comparison of these dimensions shows that the air-cells in the bird are several times smaller than the individual particles of epithelium, which are considered by some to line them; hence the idea of the ultimate subdivision of the air-passages in birds having a lining of ciliated epithelium is seen not only to be incorrect but absurd.

Anatomically considered, the mere areolæ formed by the anastomoses of the pulmonary capillaries can scarcely be looked upon as air-cells; but, physiologically regarded, they are as much entitled to be considered as such as are the large regularly-formed polyhedral spaces in the human lung, or even the saccules in the lung of the reptile.

Although the ultimate subdivisions of the air-passages in birds are so extremely minute, yet it is in the examination of the lungs of this class of animals that we see a respiratory organ in its greatest state of simplicity, and in which the process of respiration can be best studied. It is most obvious, on a careful inspection of the well-injected lungs of a bird, that the air, in traversing the minutest subdivisions of the air-tubes, passes close to the vessels themselves, these forming the immediate boundary of these subdivisions. Hence it is clear, that the aeration of the blood in the lung of the bird is carried on without the necessity either of ciliated epithelium or basement membrane, but simply by the action of the inspired air upon the blood in the vessels, with no other membrane intervening but their coat.

That this simplicity in the process of respiration is not confined to birds, I shall now endeavour to prove by some observations upon the lungs of those mammals whose respiratory function is more energetic than that of man, but less so than that of birds.

However the organs of respiration in the different classes of animals may differ in their anatomical characters, there can be, I think, no question but that the principle upon which they act is the same in all; and if the simple exposure of the blood in the capillaries to the action of the air be all that is required for the aeration of the blood in that class in which this function is performed with the greatest activity, one would think that additional structures cannot be essentially necessary to aid the action of the air upon the blood in the vessels of those animals in which the process of respiration is less active. The correctness of these inferences is shown by a comparison of the structure of the lungs of several mammals with the lungs of birds.

If the lung of the bird be compared with that of man, the contrast is so striking that the two scarcely seem to have been designed to perform the same function; but between these two extremes there are placed many links, by the examination of which it is seen that a gradually increasing resemblance in structure to the lung of the bird exists in different animals, in proportion as the activity of their respiration approaches to that of birds. In the lung of the kangaroo, especially in those parts remote from the surface, the air-cells are very small, and disposed with the greatest irregularity; the pulmonary membrane is also proportionally imperfect, being perforated in many places opposite to the areolæ of the plexuses, so as to permit the air passing through them to come into contact with the coats of the vessels, as in the lung of the bird. In this mammal the minuteness of the air-cells is such, that many are too small to have a lining of ciliated epithelium without being completely filled by it. In the lung of the rat and mouse the air-cells are still more minute, and certainly many of them are not of a sufficient size to receive even an individual particle of ciliated epithelium.* The air-cells are disposed with the same kind of irregularity, and the pulmonary membrane is deficient, as in the lung of the kangaroo. In the lung of the hare the air-cells are very small, but perhaps not so much so as in the preceding mammals. The lung of the rabbit resembles that of the hare, but its air-cells are rather larger. In the lung of the dog the air-cells are larger than in the rabbit, but still in the more central parts of the lung they are very minute, too minute, indeed, to be capable of having a lining of ciliated epithelium, without being wholly unfitted for the purposes of respiration. In the monkey the air-cells are large, and resemble those in the human lung.

It may be observed that the dimensions of the air-cells bear no proportion to the size of an animal. In the lung of the sheep and the ox, they are upon the whole about the same size, and very minute in both, so that if they had a lining of ciliated epithelium, certainly no space would be afforded for the air; and these organs, in place of possessing that degree of lightness by which they are so universally known, could not fail to have a density little inferior to that of liver. Even if the examination be continued to the lungs of the reptile, it will be found that the sacculi in the lung of the frog (the analogue of the well-formed air-cells of the human lung, and the minute areolæ of the lung of the bird) are not completely lined by ciliated epithelium.

In the numerous examinations which I have made, of the lungs of the frog, I do not recollect having seen the epithelium anywhere but upon those ramifying cylinders in which are lodged the trunks and ramifications of the larger blood-vessels. (See Appendix.) In the human lung, the partitions by which the air-cells are separated from one another consist of a single plexus of vessels, connected by a distinct membrane, whilst the sacculi or air-cells in the lung of the reptile are separated by a similar plexus folded upon itself; and, therefore, they have between them a septum composed of two layers of vessels. In birds it has been shown that the capillaries have no distinct membrane by which they are held together, the extreme frequency of their anastomoses upon different planes being sufficient for that purpose, together with the support which they receive from a strong membrane, and the ribs externally, and the lining of the bronchial tubes internally. Besides, their fixed position renders their more minute parts less liable to displacement than in the lung of mammals.

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* The cells of ciliated epithelium in the rat and the mouse are almost as large as in man.

From a general review of these facts and observations, it will be seen that the blood in the pulmonary capillaries of the three classes of animals here mentioned, the reptile, the mammal, and the bird, is exposed in different degrees to the action of the air. In the reptile, one layer of vessels being applied on its outer side to the vessels of the adjoining cell, the blood can only be acted upon, on one side of these vessels, that next the sacculi. In man, only one layer of vessels being situated in the two cells between which it is placed, the blood on both sides of these capillaries will be exposed to the influence of the air; but still these vessels, on the side where they are connected together by the pulmonary membrane, are unfavourably placed for receiving the full effect of the air in the contiguous air-cells. Lastly, in birds, the capillaries having no membrane to connect them together, excepting those which are situate nearest to the surface of a lobule, the air is allowed to pass freely between and all around them, and thus the most advantageous position is afforded for enabling the blood in their interior to expose the largest possible surface to the action of the inspired air. With the exception of these differences, which cannot affect the principle either vital or physical upon which the lungs act, the structure of these organs is the same in these three classes of animals. Hence, as it has been shown to be impossible that the aeration of the blood can be effected by a ciliated epithelium in the ultimate sub-division of the air passages in the bird, and some of the inferior mammals, it must be obvious, that it is not essential for this process in man.

Besides the gradual manner in which we see the lungs of animals approach, in their structure, the lung of the bird, which must be admitted to possess the most perfect respiratory organ, by the deficiency and imperfection of that part of the lung, viz. the pulmonary membrane, which can only answer a mechanical purpose, and which has been shown to interfere with, rather

than aid, the great design of the respiratory apparatus, the aeration of the blood, it seems probable that the office of the epithelium also is merely mechanical, and that the essential and only true organs of respiration, or rather of the aeration of the blood, are the pulmonary capillaries with the blood within them.

Appendix.—It is worthy of remark, that in certain crustaceous animals, as, for instance, in the crab, the branchial lamellæ are totally destitute of ciliated epithelium. In this animal, the water is wafted through the chamber containing the branchiæ by three pairs of long and slender organs, studded with hairs like a brush, and connected to the roots of the foot-jaws by a moveable articulation. These organs, called flabella, when in action have a regular and rapid motion, very similar to that of vibratile cilia, as seen through the microscope, in the mussel. Each flabellum is moved by a muscle destined expressly for the purpose, and the hairs upon it seem to have no motion excepting that communicated to them by the entire organ.

The air-cells in the lung of the Rat, as well as in all others in which the respiratory functions are necessarily very active, are very small, and the capillary plexuses by which they are surrounded extremely dense. There is also observable in these animals the greatest possible irregularity in the form of the air-cells; their size also is much greater in the peripheral than in the central parts of the lung.

N.B.—It was my intention to have given the measurement of the air-cells in several classes of animals, as near as I could, and also the measurement of the epithelial cells in the small bronchial tubes in each class; but the time which I have had at my disposal has been so little, that I have not been able to accomplish this object.

Art. VII.—*On the Bony Frame of the Head in different Nations.* By Professor A. Retzius of Stockholm. Communicated to the Fourth Meeting of Scandinavian Physical Inquirers, at Christiania, in July 1844 (Muller's Archiv. fur Anatomie und Physologie, 1848. Heft. iii. seite 263).

Of all the divisions of Natural History, the knowledge of the human race is the least advanced. On the one hand, the several families of mankind present differences so considerable, that inquirers have endeavoured to contemplate them as distinct forms of one race. On the other hand, no applicable characters can be produced which would justify such a proceeding. Inquirers have hence been induced to admit certain varieties of the human race, or particular races of man; but, in so doing, they have neither established a perfectly certain conception of what ought to be understood by the word *Race,* nor can they determine what are these races. Linnæus, as well as Blumenbach, distinguished the races according to the divisions of the globe. Linnæus, to whom neither the Malays nor the other inhabitants of the South Sea were known, admitted only four divisions, and to these Blumenbach added a fifth. Since their time, almost every writer who has considered the subject has proposed some change; and many have advanced on the subject propositions quite peculiar and new, which, however, upon more minute examination, have been found to be untenable.

Inquirers have in general, in this undertaking, been guided by the circumstances of colour, appearance of the hair, features, shape of the person, and language. It is easy to understand how difficult and almost impossible it must be to make satisfactory comparisons between the different races and tribes of mankind in all these respects, since it lies particularly in the nature of the thing, that the subject cannot be submitted to comparative investigation, and considered like other natural products collected in museums. Blumenbach was the first person who marked out a more certain path, by collecting the skulls of different nations; and his excellent descriptions, framed in the Linnæan spirit, with the accompanying figures, though already antiquated, and in many respects imperfect, have taught his followers in this branch of knowledge what path they ought to pursue, and with greater certainty approach more closely their object. More than twenty years have elapsed since the last Decade of Blumenbach's collection of skulls was published, and though many writers have appeared since his time, and several tribes of the human race, unknown to him, have been discovered, it must, nevertheless, be allowed, that this part of natural history is the least advanced of all.

The cause of this backwardness consists, in my opinion, in the circumstance, that inquirers have not fixed their attention, with due consecutiveness, on the essential part of the head,—namely, the skull proper, which encloses the brain.

It appears as if we were entitled *a priori* to assume, that, so far as each race or family ought to possess a certain psychical individuality, this individuality ought to be particularly expressed in the formation of the brain. This view, already brought forward on the grounds of phrenology, is in perfect accordance with the principles of physiology. Phrenologists, nevertheless, have treated this subject rather as a part of their peculiar science, than ethnographically, as a doctrine of Race-Tribes; and, in consequence of this, their representations have exercised little influence upon the latter science. It is also manifest, that, while it is reasonable to expect in any individual race or nation a certain general character, nevertheless, over and above, the personal peculiarities ought to be expressed more or less distinctly in individuals, according to differences of culture and their several directions. It is hence necessary to distinguish in a satisfactory manner what belongs to the individual, and what to the national character. For this purpose, extensive collections and accurate comparisons are required. Among nations which live in the natural state, and among those which, in other respects, stand at a higher stage of civilization, personal peculiarities are less conspicuous; but, in the same circumstances, there are greater individual differences in the formation of skulls in the same proportion, as a higher and more general formation is met with. In civilized nations, accordingly, inquirers must search for the materials for investigation, particularly among the common people, less among the higher classes, and more in the remote villages than in towns.

When Nilsson, in 1838, in the first Number of his classical treatise, DEN SKANDINAVISKA NORDENS URINVANARE, fixed the type of the Gothic and the Lapland skull, he had only opportunity of examining few specimens of these. He gave it in charge to me, as I was stationed in a place in which a great number of instances might be obtained, to collect proofs in favour of his propositions. This I did; and, at the meeting of the Association of Physical Inquirers at Stockholm in 1842, I communicated the results of this inquiry, which confirm in every respect the view of that acute naturalist.

I quickly found in this investigation, that the peculiarities in shape, which so strongly distinguish the Goths from the Laplanders, must be found also in other nations. Upon this principle I arranged the collections within reach, and thus arose the classification of tribes which I have presented in my Essay on the Shapes of the Northern Skulls. This I first communicated to Professor Ritter of Berlin, when, in the autumn of 1840, he visited the Anatomical Museum at Stockholm. He was pleased with the method, and requested me to follow it out. Soon afterwards, I communicated the same to the Academy of Sciences, and, in the subsequent year, to the Society of Naturalists' Friends in Berlin. Although this classification has been honoured by approval from different quarters, yet I regarded it as still unsettled, so long as it was not subjected to more full examination; and it should not have been produced in the treatise mentioned, had I not been particularly urged thereto by Professor KARL SUNDEVALL, whose knowledge in natural science, and especially in ethnography, I hold in high estimation. The applicability of this method of classification has also been recently made known by Professor Nilsson, in the preface to his work, On the Original Inhabitants of North Scandinavia (4th number, 1843); and these are the circumstances which have encouraged me to communicate again some observations on the same subject.

In the previous remarks, it has been intimated, that, in the determination of the characters of different tribes, we must adhere particularly to the most usual shapes of the skull-formation. In the classification, of which I traced the outline, I have admitted only two forms, namely, the short, round, or quadrangular, which I have named the brachykephalous; and the long or oval, which I have named the dolichokephalous. In the first sort, there is no difference between the length and the breadth, or only a very slight difference; in the second, the difference is considerable. This difference, in longitudinal dimensions, depends in most instances on a smaller or greater development posteriorly, in the direction of the occiput, so that this region in the brachykephalous form is short, generally flat or flat-rounded; while, in the dolichokephalous, the same region is in general long, and something compressed on the sides. The first has the *conceptaculum cerebelli* mostly ascending; the second present it more horizontal. In connection with this, we further find in the brachykephalous form, that the *conceptaculum*, or cavity for the posterior cerebral lobes, hardly covers completely that for the *cerebellum;* whereas, in the dolichokephalous form, it goes beyond the latter. The brachykephalous form has the parietal tuberosity for the most part strongly developed, and the portion of the parietal bone lying behind this bent downwards. In the dolichokephalous form, this tuberosity is often wanting. The parietal bones are gently rounded, and their posterior portion forms a platform stretched backwards, which descends behind the occipital tuberosity. In the brachykephalous skull, the occipital tuberosity is often wanting; whereas, in the dolichokephalous, it is strongly marked.

The dolichokephalous form is particularly connected with a larger degree of development in the posterior cerebral lobes in the posterior direction. In the brachykephalous skulls these lobes are shorter; but in some tribes they are more developed in breadth. On what circumstances these different relations depend, and what they indicate, is, in the present state of science, the difficult point to be determined. I believe, nevertheless, that the peculiarity must turn on this circumstance, that during the embryo condition the anterior lobes are first developed; then the middle lobes; and, lastly, the posterior lobes are formed. In the human race we find, in the third month of gestation, the posterior lobes indicated only by a small notch or *gyrus;* and even in the fourth month they are so imperfectly marked, that they might be regarded as still wanting. It is known that during this period the whole posterior part of the hemispheres is concealed, and occupied by the body named hippocampus, which belongs to the middle lobe. If we consult comparative anatomy, we find in animals generally the same order observed in the development of the cerebral lobes. In most fishes, we find in the anterior solid cerebral tubercles only rudiments of the anterior lobes; while in the cartilaginous fishes these lobes contain cavities. In Amphibious Animals and Birds, in which the hemispheres also contain ventricles, the hippocampi, on the other hand, are wanting; their hemispheres are, consequently, analogous to the anterior lobes of the human brain. In mammiferous animals the hippocampi are generally present; but the posterior lobes are wanting, or appear only in a rudimental shape. Neither in the shark, nor in quadrumanous animals, both of which possess rudiments of the posterior cornu of the lateral ventricle, are the posterior lobes separated or limited by a proper fissure as in man. It may hence justly be admitted, that the cerebral hemispheres in mammiferous animals in general consist each of two lobes, namely, the anterior and the middle; and that only the human brain occurs with anterior and middle lobes, with completely separate posterior lobes. We hence see distinctly that the posterior lobes must perform a part which is much more important than has been usually ascribed to them. I have further here to observe, that shortness in the occipital region does not always prove a limited development of the brain; because this limited development in many instances, as was above intimated, is associated with increased development, both in the transverse and in the vertical direction. The circumference of the portion of the organ lying in this region may hence be enlarged in breadth and in elevation, and in the same proportion also in energy, although this probably supposes a changed direction.

The remaining portions of the bony frame of the head belong to the formation of the teeth, the jaws, and the organs of sense. Every anatomist knows in what dependence the size and shape of the jaw stands to the formation of the teeth; from the new-born infant, in whom the teeth lie still enclosed in their sacs, to adults, in whom they are seen with long deep roots; and again to the aged, in which the alveolar cavities are collapsed, and the alveolar processes have wasted away and disappeared. Still more striking is this relation in a great number of animals, as in elephants, in the hog tribe, the walrus, and similar animals, in which certain teeth acquire so large a degree of development, that the face and the greater part of the head is thereby almost deformed.

In a similar manner is known the influence which a greater or less degree of expansion of the organs of smell exercises on the formation of the face; the same holds good, though in a slighter degree, as to the organ of taste and the eyes; still it must be admitted, that the jaws perform a principal part in the formation of the face, particularly as the zygoma cannot be viewed in any other light than as a dependence of the upper jaw. In animals the muscles of mastication possess a mighty influence both upon the jaw and also upon the outer portion of the skull; and the same is true of the operation of the cervical muscles upon the configuration of the hindhead; this relation, however, takes place in man in a degree so slight, that it merits in this inquiry little attention.

The profile of the face depends consequently in its most essential relations upon the formation of the jaw. Among the Iran and Indo-European nations, the straight perpendicular facial or profile line has been regarded from the most ancient times as one condition of a noble and beautiful countenance. This line depends upon the proportional symmetry of the jawbone, and the zygoma, to which also pertains the perpendicular direction of the alveolar processes and the teeth. The counterpart to this facial form arises from the disproportionate size of the parts of the jaw, which for the most part is associated with an obliquely outward direction of the crowns of the teeth; a formation which is met with in all parts of the world except Europe, and is general among the rudest and most uncivilized tribes. When this mode of formation is found among Europeans, it is to be viewed as a deviation from the normal type, as a middle or spurious form. It manifestly constitutes a transition from the lower animals, especially the ape race, to the nobler forms of the human head.

I have assumed, that these two formations now mentioned, must form the fundamental principle of the chief divisions of the forms of the face, which consequently must be assumed to consist of two. The first with straight profile line, or a profile line approaching to straight, I have named the ORTHOGNATHIC, the second the PROGNATHIC, a denomination which Prichard has especially introduced for the small elongated form with prominent jaw, which distinguishes the negro, but which I think must be employed in a more extended signification.

In these two divisions, several other sub-divisions come to be arranged; for instance, prognathic with broad, and prognathic with small, alveolar arches, with elongated small or short broad face, and so forth; the full exposition of which I must defer, until I have opportunity still further to enrich our collections, or in other modes to obtain more extended observations.

I have here stated the opinion that we must admit two fundamental forms of skull, the DOLICHOKEPHALOUS, and the BRACHYKEPHALOUS; and two fundamental forms of face, the ORTHOGNATHIC, and the PROGNATHIC. Each of these specified forms of skull may be united with two forms of face, in following out which the fundamental shapes of the head may be referred to four, and the human families arranged according to these may be divided into GENTES DOLOCHOKEPHALÆ, ORTHOGNATHÆ, and

G. D. Prognathæ, and Gentes Brachykephalæ, Orthognathæ, and G. Br. Prognathæ.

In Europe are found the Dolichokephalous Orthognathic and the Brachykephalous Orthognathic forms of skull. The first formation is predominant in the western, small, densely peopled portions, distinguished for high cultivation; the second are common in the eastern, more extensive, thinly peopled portions, in which several nations present lower stages of civilization.

To the European Dolichokephalous Orthognathic forms belong the following nations:—
Swedes,
Norwegians,
Danes,
Hollanders,
Germans,
English (Kelts)
French,
Irish,
Scottish,
Belgians.

Among the French is a considerable proportion of Keltic skulls, which are distinguished among Europeans most of all nations, from the most ancient times, and even at present, by the length of the skull, and especially of the hindhead. Upon the forms of skull predominant among the Spaniards, Portuguese, Italians, and Greeks, I want information. But I conjecture that they belong to the same division as the nations now mentioned.

As to Sweden, it is established beyond all doubt, that the Swedes have the oval skull, with elongated hindhead, and straight, almost perpendicular, profile-line, and well-proportioned facial shapes. That the relation is the same among the Norwegians, I had occasion this summer, during my residence in Norway, to be satisfied, partly by examination of a number of country people whom I met with in the course of travelling, and partly by means of the collection of skulls in the anatomical museum at Christiania, from which, with permission of the Curator, Dr Neiberg, I took without selection, the specimen which I here produce. This skull presents the purest Dolichokephalous Orthognathic shape. Another, which I brought myself from a Norwegian warrior of the middle ages, is in circumference something smaller, but altogether of the same shape. The small impression upon the occipital protuberance, which is observed pretty generally in the Swedes, and was mentioned in my previous reports, I have not found in the Norwegians.

As to what relates to the Keltic race, Professor Nilsson has already shown that those who inhabited Sweden possessed particularly long heads. One Keltic skull, moulded in plaster, which I received from London, through Major Beamish, is distinguished for its elongated hindhead and its low forehead. Another Keltic head, likewise in plaster, which was sent to me by Dr Wilde of Dublin, is also very much elongated, with long hindhead.

Three years ago I received a visit from a learned Frenchman, whose skull attracted my attention. The frontal tubercles were wanting; the frontal bone formed an oblique backwards, ascending, something arched platform to opposite the limits of the hindhead. The latter was much elongated and large. On interrogating him concerning his descent, I learned that his native country had been in ancient times inhabited by Keltae. Subsequently I met with two other natives of France, with the same form of head, who, in like manner, believed that they were of Keltic extraction. Since, in other respects, the population of France consists of several different stems, and more minute inquiry upon the formation of their skulls have not, so far as I am informed, been made, so I can only venture to assume it as a probability, that the Dolichokephalous Orthognathic is the predominant type of formation. I must here, however, remark, that I have also met with natives of France, possessing the short broad skull.

To the Brachykephalous Orthognathic nations of Europe belong ....
- The Turks,
- The early Avars in Hungary,
- The Laplanders,
- The Sclavonians,
- The Tschudi,
- The Basks.

Since I published my report upon the form of the skull of the inhabitants of the North, my views upon the shape of the Sclavonic skull have been confirmed. I have since that time received two Polish skulls, through the Medical Councillor Herzog, in Posen, and two Czechish skulls from Professor Hyrtl of Prague. Further, I have examined two itinerant Sclavonians from Hungary; and I find that they all belong to the brachykephalous figure. The most satisfactory information, however, I have received from Professor Van der Hoeven of Leyden, to whom ethnographical craniology owes so much. In letters both to Professor Sundevall and to myself, this gentleman states, that he has examined a great number both of Russian and other Sclavonian skulls, all of which prove that the Sclaves belong to the brachykephalous figure. The Greek skull, which Blumenbach has described and represented in the tenth decade, is brachykephalous; a similar one in plaster is found in the Museum of the Caroline Institute. But I cannot believe that this skull expresses the true Grecian type.

Of the Asiatic races, partially mingled with the adjoining European races, I have hitherto obtained little information; but I am nevertheless convinced, that all the four principal forms are observed among them, namely :—

To the Asiatic	1. Dolichokephalorthognathic nations belong	The Hindus, The Georgians.
	2. Brachykephalorthognathic nations belong	The Samoieds, Jakuts, Burats, Afghans, Avars, Tschudes and Finns, Turks and Persians.
	3. Dolichokephaloprognathic nations belong	The Chinese, The Japanese.
	4. Brachykephaloprognathic nations belong	The Kalmucks, The Malays.

Among the inhabitants of the South Sea Islands are found, so far as I am aware, only three forms, namely:—

Of the Brachykephalous orthognathic...	The Tagals.*
Of the Dolichokephalous prognathic nations	Australians, Amboinensian.†
Of the Brachykephalous prognathic ...	Malays, Otaheitians, Papuas.

It was long my belief that the orthognathic form of face did not occur among the inhabitants of the South Sea; but Meyen's description of the Tagals, and his excellent figures of their skull, give me reason to regard them as belonging to the brachykephalous orthognathic race. This author, indeed, has the following words: "Only the strongly elevated small nose, and the something projecting upper jaw, might approximate the shape of this skull to that of the European race; but with the skull of the Mongols it can in no manner be compared." This statement indicates a lower degree of prognathism, which indeed results neither from the preceding matter in the description, nor from the delineations; but it is sufficient to suggest doubts how far these Tagals belong to the orthognathic or the prognathic division of the human race. Since, in the meanwhile, the delineations, and also several passages in the description, speak in favour of the first-mentioned form, I have thought it incumbent to admit this as the correct one.

Among the skulls of the inhabitants of the South Sea Islands, which are preserved in the museum of the Caroline Institute, there is one of a Murry-Australian, from Port Adelaide in South Australia, which my countryman, Captain Waerngren, brought home with him some years ago. This skull is remarkable for its resemblance to a negro skull. The cerebral cavity, as in the negro, is small and long-oval, with elongated hindhead; the jaws are broad; the temples are still flatter; and the floor of the hindhead is set lower and more horizontal.

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* Meyen Nova Acta Acad. Cæsar Leopold Carol. Tome xvi., part i., p. 47.

† Sandifort Tabulae Craniorum Div. Nat.

The natives of Africa, although consisting of many different tribes, have all, so far as I am informed, the long oval skull. The greatest number of these are prognathic, and some in the highest degree are so; few only are orthognathic.

To the African dolichokephalorthognathic nations belong the	Nubians, Abyssinians, Berbers, and the ancient Guanches.
To the African dolichokephalous prognathic nations belong	All the negro races, the Kaffres, the Hottentots, the Kopts.

By the kindness of Dr E. Carlsson, who, as principal physician in the Swedish frigate Josephine, visited the northern coast of Africa, I recently received a Kabyle skull, the length of which was to the greatest breadth as 180 : 133, and to the smallest breadth as 180 : 100, the length being to the vertical height as 180 : 156. The shape of this skull is oval, but the frontal bone is broad; the parietal tuberosity on the middle of the arched temporal bone is small; the temples flat; the hindhead something inclined; the occipital tuberosity small, lowly situate, limited; the elevations for the cerebellum small; the *foramen magnum* large; the mammillary processes broad and short; the auditory apertures narrow, declining backwards; broad prominent zygomatic arches and zygomatic tuberosities; the root of the nose broad, and the nasal bones well elevated. The shape of the skull is oblong-oval, but it shows an approximation to a brachykephalous quadrangular figure.

In the museum of the Caroline Institute are preserved four skulls of Egyptian mummies, namely, a male skull, with the skeleton belonging to it, from a mummy presented by Mr Provost Liedman, and three skulls of mummies sent by Hedenborg. One of these is the skull of an aged man, the second of an aged female, and the third of a young woman. The last was neatly skeletoned when I received it; the two others were surrounded with the natural coverings, and, besides, enveloped in bandages of cotton cloth, and covered with a thick layer of black pitch. The male skull sent by Hedenborg was further gilded in several places of the face with gold leaf. The hair of the male skull was cut off; on that of the female it was still present, half an ell long, almost straight, something curled, and moderately fine. In all three it was bright chestnut-brown. All four skulls were of oblong oval shape, with the larger circumference, as in the negro. In the male skull, the greatest length is to the greatest breadth as 1 : 137; the forehead is small; the coronal region well arched; the temples are flat; the parietal bone, from the vertex backwards, declining; the hindhead long and small.

The first male skull of the three has a large interparietal bone.

The occipital tubercle goes one inch behind the occipital protuberance, which, in both male skulls, form a large process. The *conceptaculum cerebelli* is small, and lies in a horizontal direction. The lines of the attachments of the cervical muscles are in all of them strongly marked. The mammillary processes are large; the occipital foramen is of an oval-round shape,* of medium proportions; the zygoma, the zygomatic arches, the orbits, and the cheek cavities, are as in the negro; but the root of the nose is raised as in a European. The lower nasal spine, which, in the negro, is not unfrequently wanting, is very large and prominent; the distance between the nasal spine and the alveolar edges is large; the alveoli are large; the alveolar processes prominent; the roots of the teeth are long; the teeth in the first of the three of the same shape as in Europeans in general. In two of the others, the crowns of the teeth are worn down to the cervix. The lower jaw is not high; the chin is small, but truncated; the alveolar processes are something prominent forward. The male skulls are formed with unusual thickness and strength.

On these skulls we may make the same observation which Prichard makes on a mummy skull in the Hunterian Museum, "That the European form is, with the exception of the alveolar processes, the most predominant." From what I believe I have ascertained by macerating the skin, I infer that the colour of the possessors of these skulls was a chocolate-brown. Upon comparing what I had thus ascertained as to the skulls now mentioned, with the facts given by other writers, I conclude that these mummies must have belonged to the Kopts, or the ancient inhabitants of Egypt.

The races of America present for the classification now under notice, a high degree of interest, partly because they still live almost all in a state of nature; partly because in consequence of the number of their different languages and tribes, Desmoulins and other writers, ancient and modern, regard the Americans as a distinct variety or race of mankind. Bory St Vincent admits two species of Americans, namely, Columbians and Americans proper,—the first inhabiting North America to the Equator; the last, the other parts of South America. Meyen reckons in like manner two American races, namely, a northern and western, the Caraib, and a eastern which he names the Coast race. Morton, in like manner, divides the Americans into two large divisions, namely, one originally belonging to the country, which he names the American; and an immigrant or introduced race, which he calls the Toltekan. To the head of America he refers all the barbaric nations, excepting the Eskimos, which he names Polar-Mongols, and considers as a spurious or bastard offshoot from the Teppewahs and Mongols. These proper or native Americans, again he distinguishes into three principal families:—1. the Apalachian or North American; 2. the Brazilian or North-South American; and 3. the Patagonian or South American. To the Toltekan division he refers those nations, which already, before the discovery of America, had formed organized communities, possessed a certain degree of civilization, and to whom was attributed the erection of the remarkable ancient buildings which are even at the present time found in the state of ruins in Mexico, Yucatan, Guatimala, Peru, and similar places. Another celebrated naturalist, D'Orbigny, who lived for several years in South America, admits only for these parts of the New World, three races; namely, the Indo-Peruvian, the Pampean, and the Brazilio-Guaranic. The most recent writer, Dr Tschudi, who also spent several years in various parts of South America, admits only, for Peru and Bolivia, three races of original inhabitants, namely, the Chincas or Incas, the Coast race of Peru; the Aymaras or mountain dwellers in the Peru-Bolivian plateau, south of Azangara; and the Huanchas, who inhabit the mountainous region around the Titicaca Lake between Peru, and Bolivia.

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* Literally, an egg-round shape.

It would be in this place too lengthened a matter to show, that of these six different divisions of the American tribes, only two agree with each other. The only one which is founded upon the formation of the skull, is the most recent by Tschudi. In the other five we find under the head of one and the same race, or one and the same tribe, different shapes assembled.

In no other part of the globe does the formation of the cerebral part of the skull present so many determinate differences in form; in none more numerous and greater extremes, and nowhere are the different nations so dispersed. I received, for instance, some years ago, from Professor S. Lovén, the skull of a South Patagonian, which is distinguished for its length, its lowness, and its lateral compression. According to the accounts, this ought to be the prevalent shape in South Magellan's Land; whereas, on the contrary, the next neighbours to these people, namely, the Pampeans or Puelches, have a short, broad, and more elevated skull. What anatomist or ethnographer has not directed his attention to the long-necked, small skull, with depressed forehead, of the Peruvians, with which Pentland and Tiedemann first made us acquainted, and which, so far as we can infer from the essay of Tschudi upon the original inhabitants of Peru,* having been obtained in the department of Junin, had belonged to the tribe named by him Huanchas, who dwell in the vicinity of the entirely opposite brachykephalous Chincas race. In the Georgias, Florida, and in the Mississippi, are found the Creek and Natchez Indians, distinguished by the short and elevated figure of their skulls, bordering upon the dolichokephalous Tcherokees. In the northern parts also of Canada are seen brachykephalous races bordering on the dolichokephalous Eskimos.

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* Muller's Archiv., 1844, Heft. ii.

I regret that I have had opportunity to examine carefully only one North American skull, and lately to see the expensive work, by Morton, CRANIA AMERICANA, which has, with great show, made clear the richness, in variety of forms, of the skull prevalent among the American tribes.

Of South American skulls I have three specimens of Aymara-Peruvians, two of those name Inca-Peruvians, two Botocudis skulls, one of which was sent by Mr Freireis, of Rio Janeiro; several Caraib skulls, three Auracanian skulls, one Charruas skull, one Puelches skull, obtained from the state of the Patagons, in the Republic of Buenos Ayres, from M. Tarras, Swedish and Norwegian Consul-General in Monte-Video, a man zealously devoted to natural science; and one South Patagonian skull, which, as was already stated, was procured by Professor S. Lovén. With these I have used, for comparison, Blumenbach's DECADES CRANIORUM, Sandifort's excellent TABULAE CRANIORUM DIVERSARUM GENTIUM, and other works.

According to the conclusions which I have been able to deduce from these materials, the American RACES OF TRIBES may be, in reference to the figure of the skull, arranged in the following manner:—

- Dolichokephalous Prognathic Nations.
  - Of North America.
    - Greenlander and Eskimos,
    - Kalushes,
    - Tcherokees,
    - Chippeways,
    - Irokees,
    - Hurons,
    - Tschikkesahs,
    - Cayugas,
    - Ollogamis,
    - Pollovalameh,
    - Lennilenape,
    - Blackfoot Indians,
  - Of S. America.
    - Botokudis,
    - Caraibs,
    - Guaranis,
    - Aymaras,
    - Huanchas,
    - South Patagonians.

Brachykephalous Prognathic Nations.	Of North America.	The Natchez, Creek Indians, Seminoles, Puches, Klatstoni.
	Of South America.	The Charruas, Puelches, Araucanians, New Peruvians.

Brachykephalous Orthognathic Nations.	Of North America :	Azteks in Mexico?
	South America:	Chincas in Peru?

Upon the skulls of the Peruvians, which have been examined by several naturalists, a peculiar discordance in the statements prevails. Upon this point I may be permitted to offer a few remarks.

Meyen delineates in the memoir already referred to, several Brachykephalous prognathic Peruvian skulls, which he considers as having pertained to the ancient inhabitants of the country. Morton represents also one such under the name of Ancient Peruvians, but at the same time, another slightly changed form, under the name of New or Modern, Peruvians.[†] D'Orbigny[‡] mentions four Peruvian nations, namely, Quinquas or Incas, Aymaras, Atacamas, and Changos; but, according to his statements, all have oblong heads, and, so far as can be inferred from the description, all are prognathic. Tschudi also admits four Peruvian peoples, whom he denominates races; but of these only three are original races, and the fourth is hybrid. Two of these are Brachykephalous, and two are Dolichokephalous. The Brachykephalous are the Chincas, and a bastard form of these now constitute the greatest part of the inhabitants of the coast of Peru. The last are Aymaras and Huanchas. In the museum of the Caroline Institute are preserved three forms of Peruvian skulls, namely, one short, under the name of Inca; one oval, Dolichokephalous prognathic, distinctly the Aymaras of D'Orbigny, and Tschudi, and with unusually long hindhead, and low forehead; also Dolichokephalous prognathic, derived, according to Pentland, from the Huacas country. These specimens I have long regarded as typical of the skulls of the Peruvians; but I

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[*] Nova acta Academ. Leop. Carol. Tome xvi.

[†] Frorieps neue Notizen Band xv. No 13, uff. Fig. 14, and f. 15.

[‡] For figures of the ancient Peruvian skull, we refer to volume fifty-fourth, 1840, pp. 458 and 459; where also may be found, with an account of the work of Dr Morton, full information on the subject of cranial forms up to that time.

have been always in some degree of uncertainty, by reason of the discordant statements given by naturalists who had visited the country. So much more agreeable to me was the investigation of this subject by Tschudi. This author admits, as has been already observed, three original forms; one, Brachykephalous, the Chincas; and two, Dolichokephalous; one usually oval, the Aymaras; and one remarkably oblong oval, the Huanchas. Tschudi has both spent a longer time in the country than other travellers, and he has examined the unmixed races, and he explains the manner in which the mixed races have arisen. He mentions on good historical evidence, that the Aymara race, from which proceeded the dynasty of the Peruvian kings, first subjugated the Huanchas, and afterwards the Chincas; and that the subjugated races were mixed with the victorious, and adopted their language, religion, and customs. Hence arose bastard or spurious offsprings, and variations in three different directions, according to the three original races; and it is clear, that travelling inquirers may easily be led astray in their conclusions amid circumstances of so great complexity. It appears that Tschudi has been guided particularly by the shape of the skull, and he has probably succeeded thereby in disentangling of its difficulties, a subject, which, in an ethnographical point of view, is of proportionally great interest, as the traces of past civilization and history attract attention.

The view of Pentland, Bellamy, and several other observers, that the very oblong, flat-foreheaded Peruvian shape of skull, is produced naturally, and not by art, as D'Orbigny and others maintain, is confirmed by Tschudi. I in like manner adopt the view of Pentland, and I have formerly on other occasions expressed myself in favour of this opinion.*

In the above given arrangement of the American national tribes, I have admitted the Azteks and Chincas; but I have placed opposite to them a mark of interrogation, because I am not certain as to the fact of their true position. D'Orbigny's Quinquas have the jaw-bone more prominent than the Caucacasian race.† The same character appears to be the case with the Aymaras and others. The Brachykephalous Peruvians of Meyen are also prognathic. The Chincas of Tschudi, on the other hand, are, according to his description and figures, orthognathic; and the same is the case with the Incaca skull from London, in our museum. In the instance of the Azteks, I have supported my inferences on the fluctuating facts given by travellers.

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* Ofversigt af K. Vet akad forhandl, 1844—N. 3, pag. 40, Ubersetzt: Hornsbuhs Archiv. Skandinav. Beitrage, su Naturgeschichte, th. i. seite 151.

† L'Homme Americain, Tome i. p. 27.

From the facts and considerations now adduced, the following inferences may be regarded as proved:—

1. That in Europe, the dolichokephalous and brachykephalous orthognathic forms are the only ones which occur, and indeed in nearly equal proportions; that is, while the shape of the skull may be either elongated or round and short, the direction of the jaw always affects the vertical line.

2. In Asia, all the four forms of skull and face are observed, and, as, I believe, in nearly equal proportions.

3. In the islands of the South Sea are observed three forms of skull, of which the dolichokephalous-prognathic and the brachykephalous-prognathic are the predominant; and, probably, nearly in like number, and less general, are the brachykephalous-orthognathic forms of skull.

4. In Africa the dolichokephalous-prognathic form of skull and face is the most predominant in the largest portion of this large peninsula. On the other hand, the dolichokephalous-orthognathic form is observed only in a small portion of this division of the globe.

5. In America the dolichokephalo-prognathic and brachykephalo-prognathic forms alternate as the most numerous, and counterpoising each other, while they include among them a smaller number of brachykephalous-orthognathic skulls.

In general, orthognathism, or the vertical direction of the jaw, which is native, as it were, in Asia, appears to have selected Europe for its peculiar abode; and prognathism, or the protruded form of jaw, appears to choose the other divisions of the globe. It is remarkable, that, from the most ancient periods, the straight, perpendicular facial line has distinguished the noblest families of the human race, and, as it were, has become the precursor of civilization. Prognathism, on the other hand, has been in general the constant parent of barbarism, rudeness, and heathenism. To what degree these forms are to be viewed as primary, or as deviations from one common primary form, I leave for the present undetermined.

ART. VIII.—*On the Secretory Apparatus of the Liver.* By C. HANDFIELD JONES, M.D. *Communicated by Sir* BENJAMIN C. BRODIE, Bart. Received November 20, 1845,—Read February 5, 1846. (Philosophical Transactions, Volume cxxxvii., Art. xxiv. 1846.)

THE general arrangement of the structures composing the liver, especially of the vascular portion of the organ, has been well understood since the time when Mr Kiernan's researches were published. The chief points which since then have engaged further inquiry, are the exact mode in which the minute biliary ducts take their origin, and the disposition and function of the epithelical cellular element, which physiologists now justly consider as an agent of primary importance in the elaboration of the biliary, as well as of every other secretion. Mr Kiernan described the biliary ducts occupying the interlobular fissures, as anastomosing and giving off branches, which entering the tissue of the lobule, formed there a "reticulated plexus." This account has been very recently confirmed by German anatomists of celebrity, viz. Muller, Weber, and Kruckenberg, and their view is adopted and further confirmed by Mr Paget in the last Report of the Progress of Anatomy and Physiology, January 1845. Mr Bowman's view of the arrangement is different. He denies the existence of any lobular biliary plexus, and states that the basement membrane terminates at the surface of the lobules; he confesses, however, that we possess no accurate account of the mode of termination of the biliary ducts, and seems to agree with Henle that it has not yet been determined in what manner the contents of the epithelial cells find their way into the ducts. These two points I hope to elucidate in some degree satisfactorily in the account which follows.

If a thin section of the liver be examined under moderate compression with a linear power of 70 to 100 diameter, a number of lobules are observed of an irregular form, which, on the whole, approaches the circular; in or near the centre of each of these is a large foramen indicating the position of the intralobular vein, the lining membrane of which can be clearly distinguished; from this to the circumference of the lobule, lines of dark or mottled appearance, about $\frac{1}{1000}$th of an inch in width, are seen radiating on every side; these radii can seldom be traced in a continuous line to the margin of the lobule, but either pass into others so as to form a long meshed network, or else dip down and become lost to view; those, however, which reach to the margin can often be followed for some distance towards the centre. The appearance now described is best observed in the liver of the rabbit or the sheep, but can be seen also more or less perfectly in the human liver, and in that of the common domestic animals. If in a broken lobule, one of these radii be examined with a power of 200 linear, it is seen to be formed by the apposition of numerous epithelial cells in a linear series; these series are not constituted by a single file of cells, but they are to a certain extent superposed, so that one cell may be overlapped by one or more adjacent. No enveloping membrane can be discovered containing the lines of cells; they evidently lie free, side by side, in the interstices of the blood capillaries, and are surrounded and imbedded in a structureless substance of indistinct granular appearance, which probably constitutes their "blastema" or formative material. Each lobule is separated from the adjacent ones by narrow spaces, the interlobular fissures of Mr Kiernan; and where three of these unite there is a triangular interval, the interlobular space. Now if the margin of an entire lobule be examined, it is found to be invested by a delicate membrane, through which the outline of the last epithelial cells of the several linear series may be clearly discerned; this corresponds to the basement membrane of Mr Bowman; and the perfectly defined and smooth margin of a lobule invested by it, is strongly contrasted with the irregular jagged appearance of a broken edge. Traced laterally, this membrane is found to line the side of one lobule, to form the floor of the intervening duct, and then to ascend along the side of the opposite lobule, thus investing by a continuous surface the opposite sides of two adjacent lobules.

Again, if we follow it along the margin of the lobule, we may often assure ourselves of its existence for one-half or more of the periphery; but it is rarely possible to trace it completely round, inasmuch as the plane of the section scarcely ever coincides perfectly with that of the duct; I have, however, in three or four instances *succeeded* in doing so; and in many others where, after tracing it along a great part of the circumference, it has for a short distance been lost to view, I have obtained assurance of the presence of the duct by appearances of the following kinds, viz. the lighter colour and evident depression of the interlobular fissure, the existence of an opake deposit occupying the course of the duct, and which had been observed in other ducts whose cavities had been laid open; or, lastly, by a dark line extending from one interlobular space to another, which was formed by the concurrence of the radiating linear series of two opposite lobules, which appear to meet and terminate above their common duct. But though the real arrangement be as I have now described it, yet in by far the greater number of instances the lobules appear to be continuous with each other at one or more points, so that, although at one level the outline of the lobule be well-defined by the zone of the portal vessel and the accompanying duct, yet in all others there is a continuity of tissue, both of the capillary and of the epithelial element. This view, which differs from that of Mr Kiernan, seems to be admitted at present by most observers.*

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* I have since ascertained that the livers of different animals vary in this respect; the lobules of the organ in the Pig are separated by fissures exactly in the manner Mr Kiernan describes.

It might be objected to the above description, which regards the lobules as embraced by interlobular ducts on every side, that those lobules which form the walls of portal canals must be without ducts on the side looking toward the canal, since there exist no lobules there with which they can be in relation; the arrangement, however, appears to be quite in harmony with the description I have given. Those lobules which adjoin the portal canal on the side of the branch of the hepatic duct contained in it, have a collateral canal running along their sides from which interlobular ducts pass in at each corresponding fissure; the floor and sides of this canal are beset on their outer surface with epithelial cells; the remaining lobules, by far the greater number, which adjoin the branch of the portal vein, have a similar collateral canal from which interlobular ducts proceed, but it differs from the preceding one in not having a layer of cells on its outer surface; from both these canals branches pass off, which probably directly proceed to enter the main duct.*

The most important point in the foregoing description relates to the absence of real tubular ducts from the interior of the lobules, a view which, proposed some time ago by Mr Bowman, has lately been contradicted by the German anatomists before mentioned, who in this respect coincide with Mr Kiernan. I will therefore shortly state the proofs which appear to me satisfactory on this point.

These are, first, the non-existence of basement membrane in the interior of the lobules, which, in common with Mr Bowman, I have been unable to detect; yet were this simplest constituent of a duct present, it could hardly escape notice, especially as in other glands it admits of being readily demonstrated; at the broken margin of a lobule it may be well seen that the projecting extremities of the linear series are quite free, and exhibit no trace of any containing membrane.

Secondly, if the margin of a lobule be carefully examined, where it forms the side of a fissure, the basement membrane may often be clearly seen, and through its transparent texture the terminal cells of the linear series are easily distinguished, resting against and contained by it. Now were the membrane inflected to form lobular ducts, surely some indentation or irregularity would be visible at the margin of the lobule, but I have often traced the outline carefully without observing any such.

A third proof is supplied by the result of some experiments which I made on rabbits. I tied the duct. com. choled., and shortly after death, which took place at periods varying from one to four days, I examined their livers. These organs were found to be beset on the surface and throughout their substance with numerous spots of deep yellow colour, evidently produced by accumulation of bile; a section of these spots, examined under the microscope, showed that they were very partial, never extending throughout the whole of a lobule, but frequently situated in two or more adjacent; their outline was always well-defined, and not the slightest appearance of a distended plexus of ducts could be observed. This last evidence appears to me conclusive. I can hardly conceive that if any plexus of anastomosing ducts existed, the accumulation of bile should take place in definite spots, and those not always situated in a single lobule, but in two or three adjacent.

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* The description, above given, has been taken from examination of the larger portal canals; with regard to the smaller ones I cannot speak so decidedly, but it seems fair to infer that the arrangement is similar.

With regard to the proofs from injection which may be adduced in support of the contrary view, the suggestion of Mr Bowman appears to me most probable, that the injection urged along the ducts had made its way into the interstices of the capillaries, and thus given rise to the appearance of a plexus; and in a subsequent part of this paper it will be shown that a condition of the lobules temporarily exists, in which such an occurrence might easily be conceived to take place.

Supposing it then conceded that the above account is correct, we may next inquire in what manner the structure described subserves the process of secretion as carried on in this organ. Now one peculiar circumstance at once arrests our attention, viz. that whereas in most other glands the epithelial cells are situated on the free surface of the basement membrane, and therefore in the cavity of the duct, they are here found on its deep or attached surface. In explanation of this it may be remarked, as Mr Bowman observes, that the epithelial cells are, in point of function, the real continuations of the ducts; and the remarkable linear arrangement which so generally prevails, appears to me to suggest the idea that the rows of cells represent an intermediate stage of the development of primary duct tubules, the cells being apposed to each other, as in the formation of an ultimate nerve tube or muscular fibre. That the epithelium is the essential agent in the process of secretion, is now I think acknowledged by the great majority of those who have examined the subject. Mr Goodsir, in his lately published work, has brought together a great number of examples, chiefly from the lower animals, in which it is distinctly shown that secretions of various kinds are formed during the growth of nucleated cells; and similar particles, especially under certain morbid conditions, may, in the very organ we are now examining, even in the human subject, be proved to fulfil the same office. Now where the epithelial cells are found on the free surface of the basement membrane, it is easy to conceive that the materials assimilated during their growth, are by the dehiscence of the cell, or its being cast off during the formation of fresh cells, set free in the cavity of the duct; but in the case of the liver the arrangement is very different, the greater proportion by far of the secreting cells being remote from any free surface on which their contained products might be poured out; the question then presents itself, in what manner does the secreted material of the cells find its way into the cavity of the surrounding duct? I will now detail the observations I have made which bear on this point.

The *ductus communis choledochus* of a rabbit was tied; death ensued in about twenty hours, apparently from gradual sinking, no traces of inflammation being visible; the gall-bladder was found tolerably full of healthy bile, the liver healthy, with the exception of some masses of morbid deposit which I have elsewhere described;* these were however quite local. On examining thin sections near the surface, where a good view of the lobules and their intervening ducts was obtained, it was manifest, in almost every instance, that accumulation of bile had taken place in the centre of the lobules, as indicated by a yellow zone of some width surrounding the intralobular vein; no other change from the usual appearance was observed. Now this case presents, I think, the earliest effect of interruption to the flow of the secretion, and the appearance noticed seems to point out the exact point where the secreting process has its first origin, viz. in the commencement of the rows of cells surrounding the central axis of the lobule; here, though in so remote a situation, bile is formed, and from hence it is doubtless transmitted.

In many livers I have observed a remarkable difference between the condition of the peripheral cells adjoining the duct and those situated more centrally, while those in the interior appeared of their usual pale or light yellow colour; the terminal zone was of a much darker and more opake aspect; and often, where the cavity of the duct in the fissure was not exposed, its course was manifestly indicated by this dark tract, extending from one interlobular space to another; on more particular examination this dark aspect was found to depend on the presence of very numerous oil-globules in the cells which intercepted the light. Now as we find one or two minute oil-globules in almost every cell, the conclusion seems quite legitimate, that where these are found greatly multiplied, the cell which has produced them must be in a much more advanced state than those which contain but a few. In a human liver which appeared perfectly healthy I made an observation of similar import; the section had laid open the cavity of a duct for some distance, the margin of which on each side presented a perfect fringe of cells containing bile, while, for a short space further on, the course of the unopened duct was indicated by a yellow tract of cells extending above it, whose deep biliary tinge contrasted strongly with the pale tint of the surrounding substance; in several other ducts of the same liver a similar condition was observed.

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* Medical Gazette, October 24.

These observations render it nearly certain that the secreting process reaches its termination at the margin of the lobule, and I shall now endeavour to show in what manner the secretion is discharged into the cavity of the duct. The appearance which the margin of a lobule presents when the process of secretion has been proceeding actively, differs much from that which is observed when the lobule, so to speak, is quiescent; in the latter case, as I have described it, the margin is well-defined, and bounded by a distinct basement membrane, while the terminal cells of the linear series contain few and minute oil-globules, and do not appear to project outwards in any degree; in the other case the margin of the lobule has an opake cloudy appearance from the multitude of oil-globules; several cells are seen projecting into the cavity of the duct, giving the wall occasionally a tuberculated appearance; these cells contain oil-globules, and their wall is sometimes so extremely delicate as to be barely perceptible, even under a high power. Very many oil globules are also seen, which lie evenly in contact with the sides and floor of the duct; it is difficult to determine whether these have escaped from their cells or not; it seems probable, however, that they are for the most part free, having recently been liberated by the solution of their cell-wall. The margin of a lobule in the condition now described presents no trace of basement membrane, the cells themselves form the wall of the ducts, preserving still the general outline; it seems therefore certain that the basement membrane is only a temporary structure, which disappears when the cells are actively discharging their contents. A forcible and instructive contrast to the above condition was exhibited by a liver which I examined, which was in an advanced stage of fatty degeneration; in this the linear arrangement of the cells was lost; they lay confusedly together, and were gorged with their fatty contents; the margin of the lobule, far from exhibiting any tendency to discharge the retained secretion, was invested, and, as it were, closely bound by a membrane, not of the delicate transparent texture of the basement tissue, but much more opake, and closely resembling the semi-fibrous aspect of thin layers of false membrane.*

I may here observe that I have not been able to find any epithelium lining the interlobular ducts; the basement membrane, where it exists, appears quite bare, and through its transparent texture the terminal cells can be plainly discerned, with their granular or oily contents; this is not in accordance with Mr Bowman's opinion, who considers "the epithelium of the lobules to be continuous with that of the ducts; from this, however, I am led, both by observation and the bearing of the facts now related, to dissent: it then becomes a question, in what manner does the epithelium of the larger ducts terminate? This is difficult to determine, but I am inclined to think that it serves only as a lining to those ducts which have no secreting parietes, and that in these it supplies the mucous secretion, with which we know they are lubricated. In the gall-bladder of a sheep examined immediately after death, the basement membrane of the plicæ was found to be beset with particles which had not the usual finely mottled aspect of columnar epithelium, but seemed to be composed of very minute globules; in a short time these dissolved away into an amorphous matter. In the hepatic duct the epithelial particles were very small, about $\frac{1}{7000}$th of an inch in diameter; these also disappeared very soon; the general surface was covered by a great number of globules considerably larger, but of very various size, which closely resembled the mucous globules in the secretion of the nose or pharynx. A similar appearance was observed in the hepatic duct of a dog, where, after a very short time, the epithelial particles covering the surface became converted into groups of minute globules; according to this view, the *excretory* part of the duct would have its own peculiar protecting epithelium, preparing the surface for the passage of the bile furnished by the *secretory* portion.†

From all the facts which have been now related, it may, I think, be concluded, that the cells forming the margin of the lobule are those in which the elaboration of the secretion is perfected, and that, as this is effected, they burst and discharge their contents into the cavity of the duct; this view accords with that of M. Henle, as to the arrangement of the ultimate secreting elements of the mammary, lachrymal, and salivary glands, which he believes to consist of vesicles filled with nucleated particles, seated on the closed extremity of a terminal branch of the duct.

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* In cases of this kind the primary cell membrane is often seen to be manifestly altered, appearing striated and of a coarser texture.

† I have ascertained subsequently, by examination of perfectly recent specimens, that there is occasionally a layer of epithelium on the free surface of the basement membrane, but it is extremely delicate when it exists, is often absent, and does not appear to be in any way continuous with the secreting epithelium of the lobules.

It has now been shown that the secreting process commences in the centre of the lobule, and terminates at its margin along the line of the surrounding duct; but we have yet to consider the mode in which its progress is conducted, how the secreted material makes its way from cell to cell. This is a subject of which we have but little knowledge; the existence and nature of organic forces are as yet declared to us by their effects only; we can however refer to several examples, which exhibit a process similar to the one we are now considering; in cartilage, we believe the nutrition of the greater part of its substance to be performed by the nucleated cells which lie scattered throughout it, and attract from each other the nutrient fluid originally received from the blood; in the less perfect varieties of bone, *crusta petrosa*, the process is nearly the same. Mr Goodsir, in his description of the human placenta, has stated that a double layer of cells is interposed between the maternal uterine sinuses and the umbilical capillaries of the fœtus, which are probably concerned in the transmission of fluids from one to the other; and lastly, in plants, we know that there are several parts of their structure through which fluids are transmitted, which consist of nothing else but a congeries of cells.

Some observations may now be mentioned which elucidate in some measure this function of transmission as performed in the liver. Having examined a considerable number of these organs, I have generally noticed that those which had been secreting most actively, which presented the least appearance of retained bile or oil, exhibited the linear arrangement of the cells most perfectly; while in cases of disease, where the secretion has been more or less retained or suppressed, the disposition of the cells has been much more irregular. It would therefore seem that the linear arrangement bears a relation to the integrity of the secreting process.* In examining isolated portions of rows of cells, where their outlines could be clearly distinguished, it has been very evident that they were differently disposed with regard to each other; some were seen to overlap the next in order, and the cell-wall could be clearly traced all round; others were flattened at their apposed edges, and simply united without overlapping; in others again the septum formed by their apposed walls was so indistinct that it could only just be discerned; and in a few instances it has appeared to be wholly or in part wanting, so that the cavities of the cells were fused together. Occasionally a globule of the secretion has been observed in the act of passing from one cell to the next, but in the greater number of instances there has not been any marked difference in the contents of cells constituting a linear series. Finally, I have several times noticed that the formation of young cells takes place chiefly at the extremities of the rows; I do not mean at the margin of the lobule, but in those which were seen projecting from a broken edge; in one instance a young cell had formed at the extremity of a row of four, it was distinguished by its smaller size, more distinct nucleus, and the absence of granular or oily contents; in front of it was a large and very distinct nucleus, with only a trace of cell-wall on one side. This would seem to indicate that the organic force which determines the formation as well as the growth of the cells is exerted chiefly in the longitudinal direction, *i. e.* in the axis of the row.

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* In the case of a patient who died from the effects of dilatation of the heart, the liver was found to present the "nutmeg" appearance in a very marked manner, the cells mostly containing particles of bile of a bright yellow colour; their arrangement was remarkably plexiform, so as to give the appearance of a close network with small light interspaces.

The observations now related have an interesting correspondence with those recorded with respect to the behaviour of the cells at the margin of the lobule; in both instances the mature cell appears to dehisce in order to give exit to its elaborated contents; but in one case this takes place into the cavity of the next cell; in the other, into the cavity of the surrounding duct.

From all these observations, strengthened by the analogy to be mentioned, the following theory may perhaps be considered probable:—The mode of development of the Haversian canals in bone, of the primitive nerve tube and muscular fibre, presents us with examples of cells arranging themselves in linear series, very similar to those which we have described in the lobules of the liver; these cells thus arranged coalesce, and form the elementary parts of their respective tissues. In the liver the same type of arrangement seems to prevail; each linear series may be conceived to represent a primary duct tubule, the cavity of which remains divided by septa formed by the walls of contiguous cells; these septa at intervals give way, and by some unknown force (perhaps a *vis a tergo*, from accumulated secretion) the elaborated material is passed on to the next in order; a similar process being repeated in each cell of the series, till, by the dehiscence of the terminal one, the secretion is set free in the cavity of the duct.

Appendix.—The condition of the cells with regard to their coalescence is very various; in livers of sheep examined during the winter, a section, however thin, has been so opake that no satisfactory view could be obtained of it; in such the cells are found gorged with particles of secretion, and seldom, if at all, communicating; the basement membrane of the ducts has also a semi-fibrous aspect, and it is rare to observe the margin in an active condition. These facts, and the circumstance that the fusion of the cells is not so frequent in any case, as we should expect if it were essential, have led me subsequently to believe that a process of transmission *may* go on *through* the septa of the rows of cells and basement membrane, though there can be no doubt that it must proceed much more rapidly when the cells have coalesced and the basement membrane has disappeared.

Art. IX.—*On the Presence of Arsenic in Mineral Waters, and in the Deposits near their Sources.* By MM. Chevallier, Gobley, Schauefele, and Filhol. (Annales d'Hygiene, T. xxxix., p. 172, ct xl., p. 224. 1848.)

It is known that, notwithstanding the multiplied researches made on mineral waters, different principles capable of communicating active properties to these liquids have remained long unknown; and that it is only in the nineteenth century, that the existence of bromine, iodine, and arsenic in these waters has been established.

The discovery of arsenic in mineral waters, which was made in 1839, is due to M. Tripier, principal Pharmaceutist at Algiers, who found that the thermal waters of *Haman Mescoutin*, which supply the baths called *Cursed Baths*, *Enchanted Baths*, contain arsenic.

The performance of M. Tripier gave rise to new researches and further discoveries. In 1846, M. Walchner, member of the directory of the mines in the Grand Dutchy of Baden, announced the presence of this metal, not only in the deposits left by old ferruginous springs, but in the ochrey sediments of mineral waters the most commended for their salutary effects. According to M. Walchner, the waters or the ochrey mixtures which contain this metal proceed from the springs of Griesbach, of Rippoldsau, of Teissach, of Rothenfelds, of Cannstadt, of Wiesbaden, of Schwalbach, of Ems, of Pyrmont, of Lamschied, and of the Valley of Brohl, near Andernach. An account of the discovery of the presence of arsenic in the waters of Wiesbaden was published in this Journal, in April 1847, volume sixty-seventh, p. 575.

In 1847, M Chatin was the first to make known the presence of copper and arsenic in the waters of a chalybeate spring in the Park of Versailles; and thereby to give confirmation to the fact announced by M. Walchner.

In the course of the same year, M. Lemonnier ascertained the presence of arsenic in the deposits of the ferruginous spring of Bagneres-de-Bigorre. M. Buchner announced the presence of this metal in the yellow-brownish deposits of the springs of Ragoczi, and of Pandour, at Kissingen. M. Caventou found the metal in a deposit collected near the ferruginous spring of Plombieres. M. Langlois, Pharmaceutist-in-chief to the Military Hospital at Metz, found arsenic in a ferruginous spring which issues near the village of Lorry. M. Bayard announced the presence of this metal in the waters of Pougues at Chateau-Gonthier.

In 1848, M. Henry announced the presence of arsenic in the waters of Cassuejouls; M. Meniere of Angers, in the waters and springs of L'Eperviere, department of Maine and Loire; and M. Victor Audouard of Beziers, in the waters of Villecelle, near Lamalon, Herault.

In the month of September 1847, M. Chevallier, who, with his son, and with M. Gobley, had undertaken a journey into Belgium and Prussia, caused to be collected the deposits formed at the different springs of Spa. They visited the beautiful springs of Chaudefontaine, between Spa and Liege, the deposits of which they have not hitherto been able to obtain. They planned a work which is partly completed.

Shortly afterwards, M. Chevallier, in company with M. Schauefele, Pharmaceutist at Thann, in the Upper Rhine, visited Bussang. They collected deposited sediments, and took steps to obtain the products of the evaporation of the waters of the mineral springs of Alsace, and the sediments which are found near these sources, in order to inquire if these waters contained arsenical preparations.

The labours undertaken by MM. Gobley, Schauefele, and Chevallier, are considerable. They make known the existence of arsenical preparations in a great number of springs which are situate in different departments of France.

Here is given a short exposition of the researches of these Pharmaceutists.

Of the first memoir, which was presented to the Academy of Sciences by MM. Chevallier and Schauefele, the subject is the waters of Bussang. From the researches made on these waters, it follows:—

1. That the waters of Bussang contain an arsenical salt.
2. That this salt, though in solution in the water at the time at which is drawn, becomes in part insoluble at the end of a certain space of time.

3. That the sediments taken at the springs of Bussang contain arsenic in a perceptible manner, and very minute quantities of copper.

4. That the most minute quantities of these principles, which we find in these waters, may be regarded as the partial cause of the salutary effects which are obtained from the use of these waters; but that they cannot inspire the slightest subject of apprehension.

5. That it is, without doubt, to the presence of this active principle in these waters, that must be ascribed their efficacy in the removal of certain diseases.

From the second memoir read to the National Academy of Medicine, in the name of MM. Chevallier and Gobley, the following results may be stated.

The researches made with the purpose of continuing the inquiries undertaken by Tripier and Walchner, have given rise to the presentation of two memoirs, containing evidence of the following inferences:—

1. That arsenic exists in the cold, acidulous, ferruginous mineral waters of Royat, Hauterive, of Provins; in the thermal waters of Vichy, of Saint Mart, of Plombieres, of Mont D'or, of Bourbonne.

2. That arsenic exists in the sediments collected at the springs of Royat, of Provins, of Jaude, of Saint Mart, of Hermonville, of Martigné-Briant; in the clays and in the sediments collected upon the walls of the basin of the fountain of the Civil Baths of Bourbonne; in the sediment of the fountain of Fenu.

3. That arsenic exists in the sediments collected at the new springs which have come forth at Spa.

4. That arsenic does not exist in the waters of Passy and in their sediments, old and new springs; nor in the water of Forges, nor in its sediment; in the water of Saint Allyre, nor in its sediment; in the sediments of the waters of Chateau-Thierry, of Colommes, of Pargny, of Jouy, of Boursault, of Montigny, of Amiens, of Candé; in the water and clays of St Amand.

5. That though these chemists have not obtained arsenical stains with the product of the evaporation of a litre of mineral water of Contrexeville, of Chateldon, of Pougues, of Marequerie, of Saint Remi-l'Honoré, of Enghien, of Saint Alban, of Balaruc, of Bonnes, of Cauterets, of Bareges, of Challes, of Seltz, of Hombourg, of Marienbad, of Fachingen, of Pullna, of Seidlitz, it ought not to be concluded that these waters do not contain arsenic.

6. That the law promulgated by Walchner cannot be regarded as well founded. In point of fact, according to different experiments, certain ochrey sediments are formed only by oxide of iron;

other ochrey sediments contain, besides iron, traces of copper; and others, besides iron, contain copper and arsenic.

7. That arsenic is contained not only in ferruginous or chalybeate waters, but also in those which do not sensibly contain iron.

8. That the quantity of arsenic which is present in mineral waters exerts, undoubtedly, an action on the animal economy, but that, by reason of its very small amount, it can never give rise to bad accidents.

When this memoir was read, some observations were made, tending to prove that the waters containing the arsenic are mineralized by the carbonates, and not by the sulphates. In reply to these observations, a note from the authors was afterwards read, containing the following inferences:—

1. Among the waters which have been hitherto ascertained to furnish arsenic, a sufficiently great number contain sulphates. Such, for instance, are the waters of Vichy, of Saint Mart, of Mont D'or, of Plombieres, of Bourbonne, of Spa, of Soultzbach, and some others.

2. The number of mineral waters in which the arsenic is mineralized by sulphate of iron, is very small. These are the waters of Passy, of Cransac, of Rennes, of Selles, of Bourges,* of Allevard, and of Aix.

3. The springs mineralized by crenated or carbonated iron, are, on the contrary, very numerous. They are, at the lowest present computation, in number sixty.

4. Among the carbonated or crenated waters, nevertheless, several do not contain arsenic. Such are those of Forges, of Chateau-Thierry, of Coulommes, of Pargny, of Montigny, of Boursault, of Amiens, and some others.

5. One fact recently ascertained comes farther to contradict the opinion expressed. This is the presence of arsenic in the sediments of the waters of Cransac, which contain sulphate of iron.

The third Memoir addressed to the Institute by MM. Chevallier and Schauefele forms a sort of conclusion to that which these authors addressed to the Academy of Sciences on the 29th November 1847.

The results contained in it may be stated in the following manner:—

1. The waters of Chatenois contain traces of arsenic.

2. The waters of Soultzbach contain traces of arsenic. The sediment left by the waters of Soultzbach contain perceptible quantities of arsenic.

3, 4. The waters of Soultzmatt contain very minute traces of arsenic. 5. The ochrey sediment formed by these waters contain very minute traces of arsenic.

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* The water of the spring of St. Firmin, designated as sulphated, has been examined since the time referred to, and it has been found to contain carbonate, and not sulphate, of iron.

6. The waters of Wattweiler contain traces of arsenic. 7. The sediment left by these waters contains very great quantities of arsenic.

8. The waters of Niederbronn contain only minute quantities of arsenic. 9. The deposit left by these waters contains perceptible quantities of arsenic.

The publication of the researches of MM. Chevallier, Gobley, and Schauefele has given rise to a new observation. It has become a subject of inquiry to establish, that if they had not found arsenic in the clays of St Amand, undoubtedly arsenic exists in these clays in the state of sulphuret, and that its presence is not in this state capable of being demonstrated by the means adopted by experimentalists.

To this observation the authors of the Memoir render the following answer. 1. They indicate that they had, by the processes employed, extracted from the clays of Bourbonne-les-Bains, and from the clays of Hermonville, Department of the Marne, arsenic which existed in these clays. 2. If the experimentalist takes very pure sulphuret of arsenic, obtained from the precipitation of arsenious acid by sulf-hydric acid, if it be mingled with an organic matter, and if it be treated with concentrated sulphuric acid, following the ordinary method, he obtains a charcoal, which, when taken up by water with the aid of heat, furnishes a liquid, which, when introduced into the apparatus of Marsh, causes the formation of numerous arsenical stains and rings.

The question, to know whether waters mineralized by the sulphate of iron contain arsenic, having been raised at the Academy, has induced MM. Chevallier and Gobley to solicit physicians, pharmaceutists, and inspectors of mineral waters who are settled near sulphated ferruginous springs, and especially near the springs of Rennes, of Salles (Fontaine-Levy), of Bourges, of Allevard, and of Aix in Savoy, to make several trials with the intention of resolving the question. We mention here the method to be pursued in order to determine the point, and to ascertain whether the sediments left by the waters contain copper.

Researches for Arsenic in the Waters.—The waters are evaporated to dryness; then the residue is treated by sulphuric acid, with the assistance of heat, in order to destroy all organic matters. The sulphuric product, treated by water, is introduced, after filtration, into a simple Marsh's apparatus, when it is desired only to collect stains or spots, and into a Marsh tube apparatus when it is desired to obtain an arsenical ring.

Inquiry for Arsenic in the Sediments.—The process should be conducted in the same manner; only it is necessary to take care—1st, to destroy, by means of sulphuric acid, all the organic matter, which is more abundant in the sediments, in order that the liquid, when it is introduced into the apparatus of Marsh, may not give rise to the formation of froth;—2d, to filter the water which has been used to treat the sulphuric residue only after complete cooling, in order to allow the deposition of the sulphate of lime, which is then separated, as the presence of this sulphate would constrain the experimenter when he is using the apparatus of Marsh.

Examination for Copper in the Sediments.—After having employed different processes in order to search for the presence of copper in the sediments, MM. Chevallier, Gobley, and Schauefele have fixed on the following method as the most eligible. The sediment is treated with hydrochloric acid in excess; the hydrochloric liquor is filtrated; it is then subjected to a stream of chlorine gas, in order to peroxidate the iron. To the liquor is then added ammoniacal gas in excess, which causes the precipitation of the iron and the copper, in the state of oxyde. The excess of ammonia redissolves the copper, which remains in the liquor; the precipitate is then filtered and washed, and the operator searches for the copper in the filtrated liquid.

In consequence of the discovery by M. Walchner of small portions of copper and arsenic in the ferruginous deposits of various mineral waters, and the confirmation of this fact by the researches of MM. Figuier, Chatin, Henri, and others, M. Filhol, Professor of Chemistry and Pharmacy at the preparatory Medical School of Toulouse, proposed to himself to inquire, whether the oxyde of iron which is deposited as a sediment by several springs in the Pyrenees and the Infra-Pyrenean basin, do not also contain traces of copper and of arsenic. He was desirous further to know, whether the proportion of those two metals in ferruginous mineral waters was in such considerable proportion, that physicians could reasonably ascribe to them part of the efficacy of these waters in the removal of diseases.

His attention was first directed to the ferruginous springs which flow in that part of the Pyrenean Mountains included in the Department of Ariege, where are found rich and abundant mines of iron, which are worked on the Catalan method. As previous trials had taught him that specimens proceeding from the mines of this country contain arsenic, he was naturally led to believe that the ferruginous springs in these parts would themselves be arsenical.

M. Filhol analyzed first the sediments of a spring which rises at a short distance from Foix, and which is known in the neighbourhood by the name of the spring of M. Ruffié. This sediment formed a paste, which was dried to 100 degrees. The dry residue weighed 800 grammes. A minute analysis showed that 100 parts contained the following substances:—

Anhydrous oxyde of iron	40·570
Water	18·
Organic matter	16·800
Carbonate of lime	2·108
,, of magnesia	1·060
Gelatinous silica, soluble in dilute acids	5·
Manganese	traces
Copper	traces
Arsenic	0·050
Insoluble residue (sand)	16·412
	100·

The organic matter consisted of a small quantity of the acids known under the names of crenic and apocrenic acid; but almost the whole amount of this matter differed from these two acids, and could in no manner be confounded with them. M. Filhol states that it is impossible for him to explain himself on the nature of this substance, as, in order to know it properly, it would have required a careful examination, which he was then unable to undertake.

The presence of a considerable proportion of gelatinised silica, which is easily dissolved in dilute mineral acids, the author regards as a fact which ought, according to his researches, to be very often reproduced, at least as to those sediments which are left by the ferruginous mineral springs of the Pyrenean chain and the infra-Pyrenean basin, for he has found it in all the water examined.

M. Filhol next examined the hydrate of iron, which is deposited from the spring of St Quitterie of Tarascon, department of Ariege. He found, without difficulty, the existence of arsenic and copper; but he was able to estimate the proportion of neither metal, in consequence of the small quantity of the sediment on which he operated.

M. Filhol also discovered traces of copper and of arsenic in the saline and ferruginous waters of Aulus, department of Ariege. In this instance, also, however, from the same cause, he was able to determine neither the proportion of copper nor that of arsenic.

M. Filhol further analysed the sediments of two ferruginous springs, situated in the environs of Toulouse. The first of these is known under the name of Sainte Madeleine de Flourens. The sediment left by this spring, dried to 100°, furnished, in 100 parts, the following constituents:—

Oxyde of iron,	50·421
Water,	20·027
Carbonate of lime,	2·359
„ magnesia,	0·825
Organic matter,	15·189
Gelatinous silica,	2·
Arsenic,	0·032
Alumina,	3·970
Insoluble residue,	5·177
	100·

In this instance, it may be observed, the arsenic is not accompanied with copper.

The second spring issues at a short distance from Toulouse, at the foot of the hills which bound the right bank of the Garonne. The analysis of the precipitate, dried to 100°, gave the following results :—

Oxyde of iron,	53·100
Water,	19·508
Carbonate of lime,	4·503
„ magnesia,	0·675
Gelatinous silica,	4·200
Organic matter,	12·327
Alumina,	2·910
Arsenic,	0·052
Insoluble residue,	2·719
	100·

In this sediment, as in the preceding one, no copper was found.

The organic matter, which accompanies the oxyde of iron in these two last springs, contains only traces of crenic acid; and the water contains so little free carbonic acid, that the solubility of the iron can be explained only by the existence of this organic matter.

M. Filhol ascertained the absence of arsenic and of copper in the ferruginous clays of one of the springs of Alet, department of Aude. This spring is known in the country under the name of Red Water. It is situate about two leagues from the baths of Rennes. He was unable to obtain sediments from the baths of Rennes.

M. Filhol ascertained, in like manner, the absence both of copper and arsenic, in the sediment of a ferruginous spring which rises at a short distance from Montauban, and bears no particular name.

From these analytical inquiries, M. Filhol thinks it may be concluded that the proportion of arsenic contained in the ferruginous springs which he has examined, is too small to be capable of communicating to them great activity. The arsenic scarcely amounts to the twentieth part of one milligramme in the instance in which he determined the proportion with precision.

M. Filhol is of opinion, that, if researches of the nature of those now mentioned, informed us subsequently, that the dose of arsenic in the greatest part of ferruginous mineral waters is about as small as that the analysis of which has now been given, it is evident that the experts ought not to be concerned regarding the use which may have been made of these waters by any individual who has died, after presenting symptoms of poisoning, and in whose dead body an inconsiderable quantity of arsenic may have been found.

The examination of the ground which is traversed by the ferruginous springs, in the environs of Toulouse, leads M. Filhol further to think that, conformably to the opinion expressed by M. Chatin, the iron is carried away from the soil by the organic matters proceeding from the decomposition of the vegetables decaying at its surface. The soil which surrounds these springs is indeed covered for a considerable extent with the debris of vegetables, which may furnish organic matters; it is further rich in oxyde of iron, and M. Filhol has satisfied himself that this oxyde is arsenical.

The almost constant presence of arsenic in oxydes of native iron has led M. Filhol to think, that the question to ascertain, whether, certain grounds,—for instance, those of cemeteries,—contain arsenic, might be almost determined beforehand by simple inspection of the ground. This is indeed the case in several instances. It has nevertheless happened to him to find arsenic in grounds which contained only very little iron, while he has found no arsenic in very ferruginous grounds. Analysis then becomes in all cases indispensable, if we wish to obtain perfect certainty on this question.

Another reflection relative to the condition of arsenic in arsenical grounds which he subjoins is the following.

"It is long since M. Orfila has demonstrated in the most decided manner, that arsenic contained in the earth of cemeteries is always found in them in the insoluble state, and cannot be conveyed either by the water of rains, or in any other mode, into the organs of the dead bodies there interred. Trials of the same kind, which I have made upon arsenical ferruginous earths, have led me to results perfectly agreeable to those of M. Orfila, and have satisfied me that in this, as in all other cases, the arsenic is completely insoluble, and cannot be conveyed into the dead bodies."

The following general inferences are stated.

1. Arsenic is present in a great number of springs both in the Pyrenean chain, and in the sub-Pyrenean basin.
2. Arsenic is not in all instances accompanied with copper.
3. The organic matter, the presence of which is proved by analysis, in the sediments of these springs, is not crenic acid.
4. Ferruginous grounds are not in all instances arsenical.
5. The arsenic which is found in the grounds of certain cemeteries, is always found in them in the insoluble state, and cannot, in any manner, be conveyed into the dead bodies interred in these grounds.

We subjoin, first, a table of the French Mineral Waters which contain arsenic; secondly, a list of the French Mineral Waters which are void of this mineral; and, thirdly, of the Belgian, Rhenish, and German Mineral Waters, which contain Arsenic.

French Arsenical Mineral Waters :—

NAMES OF SPRINGS.	AUTHORITIES.
Ferruginous Water of Bagneres de Bigorre,	Lemonnier.
Water of Cassuejouls, (Aveyron)	O. Henri.
Cayla, ibid.	id.
Villecelle, (Herault)	V. Audouard.
Source-Ruffié, (Ariege)	Filhol.
Sainte-Quitteric-de-Tarascon, (ibid.)	id
Aulus, ibid.	id.
Sainte-Magdelaine-de-Flourens. (Haut-Garonne),	id
Doulans (Creuse),	O. Legrip.
Pougues-de Chateau-Gouthier. (Mayenne),	H. Bayard.
Bussang, (Vosges),	Chevallier, Schauefele, Gobley.
Cransac,	Blondeau, Chevallier, Gobley.
l'Eperviere, (Maine-et-Loire)	Meniere.
Lorry, (Moselle),	Langlois.
Martigné-Briand, (Moselle),	Chevallier, Gobley, Meniere.
La Fontaine de Fenu,	Bayard, Chevallier, Gobley.
Royat, (Puy-de-Dome),	Chevallier, Gobley.
Saint-Mart, (Puy-de-Dome),	id.
Jaude, (Puy-de-Dome),	id.
Hermonville, (Marne),	Chevallier, Gobley.
Vichy, Spring of the Hospital,	id.
Spring of the Grand Grille,	id.
Celestins,	id.
Celestins Lardy,	id.
Spring of the Acacias,	id.
Spring of Puits-Carré,	id.
Water of Haute-Rive,	id.
Water of Cusset, Spring of the Hospital,	id.
Spring of the Abattoir,	id.
Spring of the Rotunda,	id.
Spring of Dames Pajot,	id.

NAMES OF SPRINGS.	AUTHORITIES.
Water of Chateldon, Spring of Puits-Rond,	Chevallier, Gobley.
Spring of Puits-Carré,	id.
Water of Plombieres, Vosges,	id.
Bourbonne-les-Bains, (Haute-Marne),	id.
Chatenois, . .	Chevallier, Schauefele.
Soultzbach, .	id.
Soultzmatt, . . .	id.
Wattweiller, . . .	id.
Niederbronn, . .	id.

Mineral Waters in France, void of Arsenic.

Water of Passy (Seine), new and old Springs.	Flandin, Chatin, Chevallier, Gobley.
Forges, (Lower Seine),	Chevallier, Gobley.
Coulommes, (Marne), .	id.
Pargny, (Marne), .	id.
Jouy, (Marne), .	id.
Boursault, (Marne), .	id.
Montigny, (Marne), .	id.
Marequerie, (Lower Seine),	id.
Chateau-Thierry, (Aisne),	id.
Amiens, (Somme),	id.
Candé, (Vienne), . .	id.
SainteRemy l'Honoré, (Seine et Oise),	id.
Saint-Amaud, (Nord), .	id.
Clays of Saint-Amand, (Nord), .	id.
Water of Allet, (Aude), .	Filhol.
Saint Allyre, (Puy-de-Dome), .	Chevallier, Gobley.

Arsenical Mineral Waters not in France.

NAMES OF SPRINGS.	AUTHORITIES.
Water of Griesbach, . .	Walchner.
Rippoldsau, . .	id.
Rothenfelds, . .	id.
Cannstadt . .	id.
Wiesbaden, . .	Walchner, Mialhe, Figuier.
Schwalbach, . .	Walchner.
Ems, . .	id.
Pyrmont, . .	id.
Lamschied, . .	id.
Brohl, . .	id.
Ragoczy, .	Buchner, Younger.
Pandour, . .	id.
Bruckenau, . .	id.
Water of Spa, Spring of Pouhon, . .	Chevallier and Gobley
Spring of Groesbeeck,	id.
Spring of Sauviniere,	id.
Spring of Geronstere,	id.
Spring of New Tonnelet,	id.
Spring of Little Tonnelet,	id.
Spring of Old Tonnelet,	id
Spring of Barissart,	id.
Spring of Hotel de France,	id.

It may be proper to observe before concluding this subject, that though M. Filhol expresses the opinion that in the waters of the springs of the Pyrenees, and the sub-Pyrenean chain, the arsenical impregnation is too small to produce any effect on the persons of those who drink these waters, such is not the opinion of other physicians and chemists, at least with regard to the German arsenical springs. M. Figuier is decidedly of opinion, that even in the very diluted dose in which the arsenic is found in these waters, it is capable of exerting effects both physiological and therapeutic. Then it ought to be borne in mind that as these waters are drank for a considerable time, and the system becomes as it were charged with them, it is quite possible, nay, most likely, that they produce very decided effects upon and within the economy. This, however, we attempted to show on a former occasion.

It ought also not to escape observation, that feeble as is the dosing of arsenic in mineral waters, its combination with iron is calculated to counteract any hurtful effects. It is indeed a fact, highly deserving attention, that while modern experience has shown that the most effectual antidote,—if such a term can be used, to the poisonous effects of arsenic, is the hydrate of iron; in mineral waters, the use of which experience has shown to be often beneficial in the treatment of disease, arsenic is combined, at least temporarily, with the same metal. It may not be perfectly safe to assert, that Nature appears to adopt this mode of administering a metal of extremely active properties, in order to render that metal therapeutic. But the fact is so significant as to the probable explanation of the efficacy of certain mineral waters, that it assuredly deserves the attention of practical physicians.

ART. X.—*Cases in Midwifery requiring Manual and Instrumental Interference; followed in the former instance—first, by Trismus, then by Hemiplegia of the Right Side; and Ultimate Recovery.* By CHARLES BELL, M.D., Fellow of the Royal College of Physicians, Edinburgh. (Read before the Medico-Chirugical Society, on the 23d May 1850.)

I HAVE been induced to bring the following cases before this society, as they appear to me to possess some important and instructive peculiarities. The first is remarkable from the rareness of its occurrence, and its unusual complications. The second affords an instructive example of the third position of the fœtal head,—a subject which has been a source of considerable discussion among accoucheurs, and the opinions with regard to which are still far from satisfactory.

On the 20th April 1849, Mrs ——, aged 30, a taciturn, delicate, scorbutic-looking woman, was delivered of her fourth child. Her labour was lingering in the commencement, but the second stage terminated hurriedly, and the child was born a short time before I arrived. The placenta was retained; but there was no obvious cause of alarm in the case, and I was in hopes, when the uterus recovered from its apparent inertia, that the labour would be completed without any unusual interference.

Having, however, waited for some time without any indication of this taking place, I gave my patient thirty drops of Battley's Tincture of the Ergot, which I have generally found effectual in rousing the uterine action; but it had no effect in this case. It now became evident that there was something wrong; and on applying my hand to the abdomen, I found the uterus lying high, and conveying a relaxed and doughy sensation to the touch. I was therefore induced to introduce my hand into the vagina, when I felt the *os tincæ* so closely contracted round the umbilical cord, as to prevent the admission of more than one finger. I immediately administered forty drops of morphia, which overcame the spasm, and I was enabled to pass my hand into the uterus as far as the placenta, which was adhering to the fundus, and it required careful manipulation to separate it from its attachment. The uterus contracted regularly, and there was no hemorrhage. I afterwards ascertained that this patient had experienced difficulty in all her former confinements in the removal of the afterbirth.

The case appeared to go on favourably for some days; but I was kept anxious by her pulse continuing about a hundred, and by her having little sleep at night. I therefore, as a precautionary measure, prescribed a febrifuge mixture,* and that she should take six grains of the compound ipecacuan powder at bed-time, to be repeated if she did not sleep. Even on the morning of the seventh day, when I was induced to make more presssing inquiries in regard to her symptoms, from her pulse being 110, she expressed herself quite free from all uneasiness. In the evening, however, after a full meal of porridge, she surprised her friends by moralising on her past life; and while they were endeavouring to compose her, she was suddenly seized with trismus. I saw her about an hour after the attack, when her teeth were clenched together, her eyes suffused, her face flushed, and she had a wild and frightened expression of countenance. She paid no attention to what was said to her; and when an attempt was made to give her some antispasmodic medicine, she turned away her face with a determined look, which gave rise to a doubt as to whether the jaws were closed by spasms or the will of the patient, such as we find in mania, to the puerperal form of which her case had some resemblance. This state continued for upwards of six hours, when the spasm ceased, and she was enabled to swallow. She was ordered to have, while awake, every two hours, one table-spoonful of a mixture, consisting of three ounces of the camphor julep, three ounces of liquor of acetate of ammonia, and one drachm of solution of muriate of morphia.

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* Liquor of acetate of ammonia, one ounce and a half; antimonial wine, fifty-five minims; water, three ounces. To be mixed, and a table-spoonful of the mixture to be given every second hour.

There was no return of the spasm, and the symptoms became very much the same as before the attack of trismus,—there being little sleep, and the pulse continuing about a hundred and ten. On the afternoon of the tenth day after her confinement, she had a severe rigor, which was followed by loss of speech, and paralysis of the whole of the right side, except of the face.* She was quite sensible to what was said to her, and was able to swallow; but she could not push her tongue forward when asked to show it. Her pulse was a hundred and ten, but too weak to admit of either general or local bleeding. It was necessary, therefore, to adopt other means to subdue fever and excitement, and she got the following medicines:—

Six grains of calomel, twelve grains of the genuine James's powder, and eighteen grains of the compound powder of ipecacuan, were directed to be mixed, and divided into six powders, one of which, in jelly, was ordered to be given the patient every two hours, while awake.

One table-spoonful every third hour was ordered of a mixture, consisting of three ounces of liquor of acetate of ammonia, the same amount of camphor emulsion, and one drachm of antimonial wine.

On the twelfth day, severe diarrhœa came on, which reduced her strength very much, and her case began to assume a hopeless aspect. This symptom was soon removed, however, by a mixture of chalk, catechu, and laudanum. The calomel and Dover's powder were stopped whenever the diarrhœa appeared; but the febrifuge mixture was continued at longer intervals.

On the sixteenth day, finding that little improvement had taken place in the power of movement and speech, a blister was applied to the back of the head, and she was ordered to take one of the following pills every four hours, until the bowels were freely moved.

Extract of colocynth, six grains; extract of hyoscyamus, eighteen grains; croton oil, three minims. To be carefully mixed, and the mass to be divided into six pills.

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* The hemiplegia in this case differed in some respects from the usual form of that disease, as observed by Sir Gilbert Blane, who states that it generally affects the left side and the face, as well as the extremities.—Cyclopædia of Practical Medicine, Vol. iii. p. 252.

The blister rose well, but it soon healed, and another was applied the second day after, which was ordered to be kept open by means of savine ointment. This dressing had little effect, as it was necessary to repeat the blister in two days, and the blistered surface was ordered to be pencilled with the aromatic acetic acid occasionally, and dressed with the issue ointment, so as to keep up the counter-irritation. The croton oil pills acted very freely, and they were in consequence given only twice a-day. From this period the symptoms began to improve, which was indicated by her being enabled to put out her tongue and to utter some words, although very imperfectly. The next step in her progress towards recovery, was her being able to move her right arm. The same treatment was continued, until a large slough formed on the lower part of the back, extending fully six inches in length, and three in breadth; when the counter-irritation on the head and neck was stopped. As this slough separated, she gradually recovered the use of her leg, and could move her arm more freely. The only medicine she had after this, was the croton oil pill, and occasionally a powder, composed of *hydrargyrum cum creta*, rhubarb, aromatic powder, and the carbonate of soda, when the tongue indicated the necessity of such medicine. Immediately on the slough forming on the back, she was put on nourishing diet, with occasionally wine and ale, as the quantity of discharge was large, and the loss of surface was considerable.

She was able to go to the country about six weeks after her confinement, although the sore on her back was not healed. The change of air had its usual good effects, and, in a few weeks, she returned home with her health much improved, and able to walk and speak nearly as well as before her illness. The only disadvantage she seemed to labour under, was a difficulty in finding words to express her ideas. When I saw her last, however, this defect was less remarkable, and she was able to take charge of her domestic concerns.

On the 6th January 1850, I was called at 10 A. M. to attend Mrs R., aged 25, a coarse flabby-looking woman, who was in labour of her first child. Her pains commenced at five in the morning, and, when I arrived, they were returning every five minutes, and were unusually distressing to the patient, while their effect in advancing the labour was very trifling. On examination *per vaginam*, I found the *os tincæ* considerably dilated, the membranes ruptured, and the head of the fœtus presenting in the third position. From the peculiar sensation conveyed to

the finger by the bones of the head, which yielded to pressure like parchment, I was induced to ask the patient if she had reached the full time of gestation, and she said she considered that she was still a fortnight short of her reckoning, and that she attributed her labour coming on to a fright she had two days previously. The *os uteri* was thin and unyielding; I therefore ordered her to have small doses of tartar emetic at short intervals, with the view of promoting relaxation; but it had very little effect, as the pains continued feeble, and the first stage of labour was not completed until three P. M. As the pelvis was roomy, and the child's head small, I was in great hopes that the labour would now proceed more rapidly, either by the forehead being turned into the hollow of the sacrum, or that it would at once pass under the pubis; but I was disappointed, as hour after hour passed without any change or advance being produced in the position of the child's head. The functions of the bladder were seriously interrupted, and it was necessary to introduce the catheter several times, and, on each occasion, a large quantity of urine was drawn off. Finding at seven the following morning that no improvement had taken place in the case, and that the head had remained stationary for sixteen hours, I proposed to the patient and her friends that I should use instruments. They at once agreed to my doing so, and I applied the forceps with great ease to the patient, and delivered the child, in two pains, without carrying the forehead round to the hollow of the sacrum.

It was a remarkably small female child, and so very weak, that the only sign of life it gave for some time was a faint quiver of the lip. The cord soon ceased to pulsate, when I immediately separated the child, put it in a warm bath, used artificial respiration, and applied stimulants to the nose and chest; which were ultimately attended by success, as the feeble creature began to give convulsive sobs at long intervals, then to breathe, but not regularly for more than half an hour after it was removed from the mother. The head was so much misshapen and elongated backwards, that the people feared that it would never assume the human form. This apprehension, however, was soon removed, for when respiration was fully established, the head gradually regained the natural shape, leaving no trace of the impression of the forceps.

On returning to the mother, and applying my hand on the abdomen, I found the uterus nearly as large as if no child had been born; and examination *per vaginam* disclosed the head of another child, presenting in the first position. But the uterine contractions were not renewed for two hours; and when they did return, they were of the same lingering and inefficient character as in the former part of the labour. As there was apparently a large quantity of the *liquor amnii*, I ruptured what seemed to be the bag of membranes, when a fluid came away, but on examination it proved to be pure blood; immediately after this another set of membranes came down distended with fluid, which I also ruptured, feeling satisfied that the labour would be facilitated by reducing the contents of the uterus. Unfortunately, however, as the waters flowed off, a loop of the umbilical cord descended, and was instantly followed by the head of the child, which became so wedged between the two cords, that it was impossible to push it, so as to admit of turning, and there was no time to send for the forceps, which I had taken home after the delivery of the first child, not expecting that I should require them for the second. The consequence was, although I made every endeavour to protect the cord by pushing it up during the interval of the pains, it ceased to pulsate a few minutes before the head was delivered, and, as was to be expected, so the child was still-born. It was a remarkably large child, and formed as great a contrast to the first-born, to encourage the notion that this was a case of superfœtation, and that the second child had been conceived some time prior to the first.

The placentæ were soon expelled, and there was no hemorrhage. On examination, they seemed to be united only by membranes; and what I had taken for a second bag of waters was an intervening cavity between the two sets of membranes containing clots of blood,—the fluid part having escaped when I ruptured the membranes.

The mother suffered for some days from retention of urine, and required the use of the catheter. There was also a considerable discharge of pus from the vagina; but these symptoms gradually disappeared, and in six weeks after her confinement, she was able to take a nursing.

This case presented some very interesting points of practical importance, on which it may not be out of place to make a few remarks. The first of these was the peculiar character of the pains, which, throughout the whole labour, were situated in the back, and although of frequent occurrence, and very distressing to the patient, they had scarcely any effect on the *os tincæ* during great part of the first stage of labour; at least it was not appreciable to the finger during examination;—and in the second stage, they had no influence whatever in advancing the child's head, or in changing its position. They were obviously confined to a limited portion of the posterior fibres; as there was none of that foreshortening of the uterus and semi-rotatory movement during the pains, observable in ordinary labour on applying the hand to the abdomen, or in examination *per vaginam;* on which depends so much the adjustment of the child to the passages of the mother.

As the patient was strong and healthy, the lethargic state of the uterus was the more remarkable; and I think it is to be accounted for by one or other of the three following causes: First, by the uterus having been called into action prematurely, and before it had acquired the peculiar vigour and strength it usually attains at the full period of gestation. This was rendered the more probable, by the statement of the patient, to which I have already referred, viz., that she was still a fortnight from her full reckoning. And the statistics of abortion clearly prove how irregularly and incompletely the uterus acts in such circumstances; hence the frequent delay in the expulsion of the blighted ovum, and the occasional retention of the placenta, giving rise to alarming hemorrhage weeks after the birth of the imperfect fœtus. Second, the uterus may have been rendered inactive, by being over-distended, such as takes place in the bladder, when that organ either acts partially or not at all. This is no unfrequent cause of tedious labour; and when its existence is suspected, our highest authorities recommend the rupturing of the membranes. Third, the uterus may have become powerless, in consequence of the peculiar position of the children preventing that perfect and synchronous contraction of its fibres which is required for the natural accomplishment of labour.

The next point of interest was the first child presenting in the third position. This is a subject which has given rise to much diversity of opinion among accoucheurs, in regard to its frequency, its results, and treatment. The older authors considered that it was of rare occurrence, and, when it did take place, it gave rise to tedious and difficult labour, requiring the application of the forceps, if not of the still more serious operation of perforation of the child's head. This opinion, however, will appear the less remarkable, when we consider that, until the publication of Naegele's valuable Treatise on the Mechanism of Parturition, accoucheurs were satisfied with ascertaining that the head presented, without troubling themselves to inquire whether the forehead were towards the *sacro-iliac synchondrosis,* or to the *foramen ovale.* I remember well, in a conversation with the late celebrated Dr Hamilton, referring to the mineral arrangement of the presentations of the fœtal head, when he ridiculed the notion of such minuteness as totally unnecessary for the successful management of labour. The knowledge of the third position, formerly entertained, therefore, was derived entirely from the management of those cases in which the labour had become tedious and difficult from some other cause than the mere position of the head, as recent experience proves that this circumstance does not necessarily occasion unusual tediousness, and that, in general, the case requires no artificial aid. The third position was well known to Smellie, who, more than a hundred years ago, laid down the principle of practice to be pursued in cases requiring interference, viz., "that the forehead ought always to be turned into the hollow of the sacrum."[*] This practice was afterwards carried more extensively into operation by Dr John Clarke, who reports the successful results of fourteen cases;[†] and it has been approved of by the profession since his time.

The remarkable difference of opinion among recent authors as to the frequency of the third position is less easily explained; and, although Naegele has given much instructive information on the subject, there still seems to be great misapprehension in regard to it. This is obvious from the very opposite statements given even by our highest authorities, in which the proportion, in regard to the first position, varies from 1 in 1336, according to Collins, to one in two and a-half according to Naegele. This celebrated author not only considers that, after the first position, the third is the most frequent in occurrence; but that these positions are "The usual presentations of the head, and the rest are unusual." I have paid particular attention to the positions of the head ever since I had the great advantage of studying the subject in the General Lying-In Hospital in London, under the superintendence of Dr Rigby, the talented translator of Naegele's work; and I have no hesitation in saying, that my experience does not induce me to admit the high average given by Naegele and other recent authors; neither am I satisfied that the statistics in regard to the fourth position are correct and established beyond a doubt. I am more inclined to believe that this position, like the third, is one of the stages in the progress of the child through the pelvis, which is of more common occurrence than is generally supposed; and that it has escaped observation in many instances, in consequence of the rapidity and facility with which the head passes into the first position.

The mechanism by which parturition is effected is another important question connected with this subject, which appears to be imperfectly understood. Naegele considers that the rotation of the forehead into the hollow of the sacrum in this case depends on the resistence opposed to the occiput by the inferior part of the pelvic cavity. This opinion has also been adopted by Dr Simpson, who treats this subject with his usual talents and research in a clinical lecture published by him some years ago. It is remarkable, however, that these eminent authors should suppose that so important a process should be the mere result of chance; and that Dr Simpson should ask the question, "What part of the floor of the pelvis serves as the resisting plane upon, and by the aid of which the occiput is thus made to rotate forward?" and should make answer, "In some, any, and in others apparently every, successive portion of the concavity of the floor of the pelvis seems to serve this purpose." Were the change in the position of the head entirely dependent on the incidental resistance of some part of the pelvis, the result would be rendered very uncertain; which is not the case; as experience has proved, what was first observed by Solayres, that, in a large majority of the cases of the third position, if left to nature, the forehead is turned into the hollow of the sacrum; and it is in consequence of this fact that our present practice is established. But that the hypothesis is erroneous, is shown by Dr Simpson himself in a subsequent passage, in which he says, "I have repeatedly observed the rotation, when, in fact, the occiput was so low as to be beyond the influence of the bones and ligaments." It thus appears that the important resistance ascribed to the pelvis cannot always be relied on.

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[*] Smellie's Midwifery, Vol. i. p. 283.

[†] Transactions of the Medical and Chirurgical Society, Vol. ii. p. 229.

We must therefore look elsewhere for the power by which the head is rotated, and a favourable termination effected in the case; and we naturally turn to the uterus itself as the most likely source. It is an organ obviously of great strength, and its fibres are so wonderfully arranged, as to call into operation all the advantages of lever force. This is strikingly illustrated during labour, when its powers are gradually developed, and constitute a series of movements which seem admirably adapted to effect the delivery of the child, unless when there is some preternatural condition of the parts concerned.

If we carefully watch the process of parturition, we observe how regularly these movements succeed each other, and how effectually they perform their specified duty. Our attention is first attracted by the "*dolores præsagientes,*" as they are called, which indicate the contraction of the fibres connected with the round ligaments, whose duty seems to be to direct the uterus into the axis of the pelvis, and retain it there. This operation is rendered obvious, not only by the diminished size of the woman as labour advances; but if the hand is applied to the abdomen during a pain, the uterine tumour will be felt to descend and become fixed.

We next observe the semi-rotatory motion, by means of which the head of the child is slowly adjusted to the intricate passage of the pelvis. This movement seems to depend on the circular fibres of the organ, but more especially those of the fundus, acting on the broad basis presented by the nates and lower extremities of the child, producing very much the same effect as the rudder on a vessel. The child floating in the *liquor amnii*, or gliding on the lubricated surface of the uterus or vagina, moves easily, and the head turning as on a pivot in a semicircular form, finds its way through the spiral cavity of the pelvis. To whichever side this semi-rotatory movement first tends, whether to the right, as in the fourth position, or to the left, as in the third, it continues to hold the same direction throughout the labour; for the pelvis, although apparently oval, presents two semi-spiral inclines, which diverge from the pubes downwards and backwards towards the lower part of the sacrum; and along one or other of these the child's head seems to descend during parturition, unless it shall be so small as to be pushed onward without turning to either side, as sometimes happens in premature children, or when the head is unusually disproportioned. This semi-rotatory movement is readily ascertained by applying the finger to the head during the pains, and it is still more observable in the progress of the child through the external passages.

The third great movement in this interesting series is apparently the result of the contraction of the longitudinal fibres, which having dilated the *os tincæ*, expels the child from the uterine cavity and pelvis, by the aid of the abdominal muscles, which are called into action like a *corps de reserve*, in the last pangs of labour. There is nothing in all this process the effect of chance; every thing seems to go on with wonderful uniformity, and is the result of the most perfect mechanism.

Although we thus see that the uterus is quite competent in ordinary cases to accomplish labour, we must guard against trusting too far the unaided efforts of nature, when anything unusual occurs in the presentation; otherwise we may meet with serious disappointment. I am the more convinced of this fact, from the case just reported, as I think I committed an error in delaying so long to interfere. Should I again meet with a case in any degree similar, I should consider myself justified in having recourse to the forceps at an earlier period.

Art. XI.—*Microscopical Examination of the Contents of the Hepatic Ducts, with conclusions founded thereon as to the Physiological signification of the Cells of Hepatic Parenchyma, and as to their Anatomical relation to the Radicles of the Hepatic Ducts.* By T. Wharton Jones, F. R. S. Received May 11, read May 25, 1848. (Philosophical Transactions, 1848. P. 277.)

1. In the contents of the larger branches of the hepatic duct, there are seen, on microscopical examination,—1st, detached columnar epithelium; 2d, free nuclei, some round, some oval, about $\frac{1}{3000}$th of an inch in diameter; 3d, minute granules, free or in amorphous flakes, globules of oil, and fragments of cell-walls.

2. In the contents of smaller branches of the hepatic duct, I have repeatedly observed, in addition to the objects just enumerated, cells of a polygonal shape and about $\frac{1}{1100}$th of an inch in diameter, containing round nuclei about $\frac{1}{3000}$th of an inch in diameter, together with minute granules and globules of oil; cells, in short, identical with those of the parenchyma of the same liver, except that for the most part they were paler, on account of the contained granules and oil-globules being fewer and more minute. In some instances the cells were partially broken up.*

3. To assist us in interpreting the observation now related, and in coming to a conclusion therefrom as to the physiological signification of the cells of hepatic parenchyma, and as to their anatomical relation to the radicles of the hepatic duct, it will be useful to examine the contents of the duct of a gland the structure of which is well understood, such as the pancreas, and to compare them with the proper anatomical elements of the same gland.

4. The proper anatomical elements of the pancreas, it is to be called to mind are;—1st, vesicles composed of *tunica propria*, opening into the radicales of the duct; 2d, the endogenous cells of these vesicles, or the true secretory corpuscles. The endogenous or true secretory corpuscles are round granulous masses, about $\frac{1}{1600}$th of an inch in diameter, containing in their interior a round nucleus about $\frac{1}{3000}$th of an inch in diameter, and either altogether destitute of a cell-wall, or possessed of an imperfectly-formed one.

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* The human liver and the sheep's liver, principally the former, were the subjects of examination. The contents of the duct were taken up for examination by means of a small microscopical forceps, passed from the larger branches in the transverse fissure of the liver towards the smaller imbedded in the substance of the organ. In this way, I believe, the accidental admixture of hepatic cells from a cut surface of the liver, with the contents of the ducts, was effectually guarded against.

5. In the contents of the pancreatic duct, there are found on microscopical examination,—1st, detached columnar epithelium; 2d, free round nuclei; and, 3d, a quantity of minute granules, free, or in amorphous flakes. Of these objects, the columnar epithelium is the same as that of the wall of the duct itself, and has evidently been detached from it; the free nuclei are identical with those of the endogenous corpuscles of the glandular vesicles, and are evidently, together with the minute granules, the fragments of those corpuscles in process of resolution into pancreatic juice.

6. To apply what we have now learned of the nature of the objects contained in matter taken from the pancreatic duct to the elucidation of our subject. It is scarcely necessary, in the first place, to say that the fragments of columnar epithelium found in the matter from the hepatic ducts have been, like the columnar epithelium, contained in the matter from the pancreatic duct, detached from the walls of the ducts themselves. Of the free nuclei, the round ones* are identical with those of the cells of hepatic parenchyma, and are, together with the granulous substance, globules of oil and fragments of cell-walls, evidently such as might be supposed to be the remains of broken-up hepatic cells, and their contents in process of resolution into bile,—as evidently as the free nuclei and granulous substance found in the matter of the pancreatic duct are the debris of the endogenous corpuscles of the vesicles of the pancreas broken up and in process of resolution into pancreatic juice. The fact of the existence of hepatic cells in the smaller hepatic ducts above enunciated sufficiently accounts for the presence of their broken up remains in the ducts.

7. From what has now been stated, I believe I am warranted in concluding that the cells of hepatic parenchyma are the analogues of the endogenous cells, or corpuscles of the glandular vesicles of the pancreas and other racemose glands, or of the glandular tubules of tubular glands, and are, like them, being constantly reproduced, cast off, received into the radicles of the ducts, broken up and resolved into the secreted matter.

8. But besides establishing this physiological proposition, the fact of the existence of hepatic cells in the smaller ducts of the liver, throws light on the anatomical relation of the hepatic cells to the radicles of the hepatic ducts,—a point the most essential in the minute anatomy of the liver, but one which has not as yet been decisively determined by direct anatomical demonstration, though different hypothetical explanations of it have been offered.

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* The oval nuclei, mentioned in § 1, resemble those of the columnar epithelium cells, and are probably derived from broken-up cells of that structure.

9, The different hypothetical explanations referred to may be reduced to two heads.

According to the explanations under the one head, the hepatic cells themselves stand in such a relation to the radicles of the biliary ducts, that they pour their contents into them, either by opening separately like follicles at all points, or, after coalescing to form tubules, by these tubules opening into cœcal radicles of the biliary ducts.

According to the explanations under the other head, the masses of hepatic cells of which the parenchyma of the liver is composed are pervaded by intercellular passages leading directly into ducts, which, from having a proper coat, are recognisable as such. The hepatic cells, analogous to the endogenous cells of other glands, which form, like an epithelium, the immediate wall of the intercellular passages, become, in the recognisable ducts, superseded by a proper epithelium.

10. Of these hypothetical explanations, it is to be observed, that those under the first head are founded on the assumption that the hepatic cells correspond to glandular vesicles,—for it is glandular vesicles and not endogenous cells which open into ducts either separately, or after having coalesced to form tubules,—an assumption already opposed to analogy, and altogether unsupported by any fact, but now completely set aside by the facts and arguments which have been adduced in this paper. Whilst the explanations under the first head must thus be rejected, that under the second head, which assumes the hepatic cells to correspond to endogenous cells, and which was first suggested by Professor Henle of Heidelberg as the most probable, has by the same facts and arguments been proved to be correct in principle.

PART II.

CRITICAL ANALYSIS.

Art. I.—*A Treatise on the Climate and Meteorology of Madeira.* By the late J. A. Mason, M.D. Edited by James Sheridan Knowles. To which are attached, *A Review of the State of Agriculture, and of the Tenure of Land.* By George Peacock, D.D., F.R.S., Dean of Ely, and Lowndean Professor of Astronomy in the University of Cambridge. And *An Historical and Descriptive Account of the Island, and Guide to Visitors.* By John Driver, Consul for Greece, Madeira. London, 1850. 8vo. Pp. 388.

About 360 miles west from Cape Cantin, on the west coast of Northern Africa, are two islands in the Atlantic, which, in consequence of lying in the route from Europe to the West Indies, have acquired, in all respects, very great importance. The largest of these, Madeira, especially has, from being the last point near Europe visited in proceeding to the Caribbean Sea, the Cape of Good Hope, and the East Indies, been for two centuries a place of great interest to voyagers from England. This island is placed in 32 degrees 37 minutes, and between 30 and 40 seconds north latitude; and in longitude 17 degrees, 5 minutes, west from Greenwich.* Thus situate, about 360 miles, or 120 leagues. west from Cape Cantin, the nearest land of the African continent,—it is about 80 leagues north by east from Teneriffe; nearly 100 leagues from the island of Ferro—and about 50 † miles southwest from Porto Santo.

Of this island accounts varying in amplitude and minuteness have been given by two classes of writers. One class have, in the course of the outward voyage to the West Indies or the East, visited the island, and communicated such details as to them seemed interesting. To this order belong Sir Hans Sloane, who, in his voyage to Jamaica in 1687, gives several important pieces of information;* Sir George Staunton, in his Account of the Embassy to China in 1792;† Maria Riddell, who in 1792 published a sketch of the island in a Voyage to the West Indies;‡ and Charles Burton, who in 1805 gave, in the account of a similar voyage, a short description of the island.§

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* This longitude, which was ascertained on the voyage of Lord Macartney to China, from several eclipses of the satellites of Jupiter, and by an eclipse of the sun on the 4th of June 1788, is adopted by Dr Gourlay and most recent authorities. Dr Mason throws aside the five minutes.

† Seventeen leagues south-west, according to Dr Gourlay. It is rather singular that Dr Pitta represents Porto Santo to be distant only fifteen miles (p. 19). It is probable that leagues are understood. In one passage Mr Driver represents Porto Santo to be 50 miles, in another 40 miles, north-east from Madeira.

Another class of writers have devoted to the history of Madeira more exclusive attention, and have produced works containing all the information which they had been able to collect, and thought desirable to communicate on the subject. At the head of this list must be placed two Portuguese authors who have made this island the subject of their studies. The first is Francisco Alcaforado, who wrote, in 1571, an account of the first discovery of the island of Madeira, of which an English translation was published at London, in 4to., in 1675.‖ The second is Antonio Cordeyro, who published at Lisbon, in 1717, a history of the islands in the Atlantic under the sway of the Portuguese monarch.¶

In 1811, Dr William Gourlay, resident physician to the British factory, at Madeira, published Observations on the Natural History, Climate, and Diseases of the Island, the result of a residence of eighteen years' duration. This work, which appears to have been written previous to 1808, contains a meteorological register, extending from January 1793 to December 1802, gives a detailed account of the most prevalent diseases, and an appendix on the mineral waters of the Island of St Miguel.**

Between the years 1809, and 1812 N. C. Pitta, a young Portuguese gentleman, a native of Madeira, resided in this city, engaged in the study of medicine. This gentleman published, in 1812, a short account of the Island, chiefly for the guidance of invalids resorting thither, and communicated much useful information on its natural and commercial, as well as its medical history.*

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* The Natural History of Jamaica. By Hans Sloane, M.D. Two Volumes folio. London, 1707.

† An Authentic Account of an Embassy from the King of Great Britain to the Emperor of China, &c. By Sir George Staunton, Baronet, Hon. LL.D. Univer. Oxon., F.R.S., &c. &c. Three Volumes, 8vo. London, 1797.

‡ Voyage to Madeira and the Lower Caribbean Islands. By Maria Riddell. Edinburgh, 1792.

§ Journal of a Voyage from London to Madeira, New Providence, and back to London. By Charles Burton, Commander in the Snow Thames, of London. London, 1805. 8vo.

‖ Account of the First Discovery of the Island of Madeira. By Francisco Alcaforado. London, 1675. 4to.

¶ Antonio Cordeyro Historia Insulana das Ilhas a Portugal, sugeytas no Oceano Occidental. Lisboa, 1717. Folio.

** Observations on the Natural History, Climate, and Diseases of Madeira, during the period of eighteen years. By William Gourlay, M.D., F.R.C. Physicians Edinburgh, and Physician to the British Factory at Madeira. London, 1811. 8vo. pp. 158.

Since the time at which the performances of Dr Gourlay and Dr Pitta appeared, immense and multiplied changes have taken place in this island. Its population has increased; its commerce has become much more extensive; the frequent visits of sailing vessels, and of late years, of the West India steam vessels, have rendered the intercourse between it and England greatly more frequent and more easy; and it has acquired a certain form and degree of reputation as a resort for invalids. All these circumstances combined, have rendered all former accounts of this island meagre and insufficient; and information both more full and more accurate was required than that which was contained in the performances already mentioned. The essays which appeared in this Journal by Dr Renton and Dr Heineken contributed to supply the deficiency so far as medical information was required. But on many other points it became an object of consequence to obtain more ample and exact knowledge of a place, between which and England the facilities of steam navigation have so greatly diminished the distance. To accomplish these purposes, the present volume is placed before the English reader. The work consists of three divisions; and the duties of authorship have been performed by three individuals. The first and principal portion is a treatise on the meteorology and climate of Madeira, by Dr J. A. Mason. This is subdivided into three divisions. The second part, which thus becomes the fourth, consists of a review of the state of agriculture, and of the tenure of land, by Dr George Peacock, Dean of Ely, and Lowndean Professor of Astronomy in the University of Cambridge. And the third, or fifth division, is an historical and descriptive account of the island by Mr John Driver, Consul for Greece at Madeira.

A work composed in such a manner comes before the reader with peculiar and rather strong recommendations. The division of labour in the duty of authorship, though it may render parts of the work dissimilar, and probably unequal, is nevertheless likely to insure the more perfect performance of each. Little doubt can be entertained that this it has in fact done. In some respects, indeed, the divided authorship has been the result of a mournful and distressing necessity. The account of the meteorology and climate of Madeira appears to have been originally planned by Dr Mason; we are not informed whether in consequence of his having occasion to visit the island for the restoration of his own health or not. What we are told is, that he was recommended, when the first threatening symptoms of obstinate pulmonary disease appeared, to repair to Nice. In his journey thither along with Mrs Mason, a relative who had joined the party was attacked at Dieppe with brain fever, and there Dr Mason attended this patient until convalescence was established. Meanwhile the favourable season for a visit to Nice was past; and a communication from Sir James Clark recommended Dr Mason to change his destination for Madeira. It was during his residence on this island for twenty-two months that Dr Mason collected and arranged the materials for the present work.

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* Account of the Island of Madeira. By N. C. Pitta, M.D., &c., Physician at Madeira. London, 1812, 8vo, pp. 128.

Dr Mason found that the climate of Madeira did not effect on the symptoms of his disorder that amount of amelioration which he had been led to expect; and probably the laborious observations which he was constantly making tended to prevent him from reaping the benefit which otherwise might have resulted. He left Madeira for Nice; but scarcely had he arrived there when he was attacked by intestinal disorder; and after the course of two weeks death took place in the 27th year of his age.

Dr Mason is represented as a diligent and enthusiastic cultivator of natural science, and a person of great originality of mind. Of the present work, the result of so much exertion and so much self-devotion, the editor properly observes, that its merits may speak for themselves.

These are the circumstances to which it is owing that the fourth part, or the sixteenth chapter, on the agriculture of the island, is by the Dean of Ely; and that the descriptive and historical shetches given in the last four chapters are by Mr Driver.

The work altogether is so greatly superior to any of those that have preceded it, that it would be absurd to institute any comparison between them. The information regarding the climate of the island is probably that which will be perused with most interest. It is ample, accurate, and precise, and contains everything necessary to guide the physician in his selection or rejection of Madeira as a residence for any given patient. At the same time, the account of the agriculture and vegetable productions of the island is instructive and agreeable; and in the last four chapters is given much miscellaneous information which will prove highly interesting to those visiting the island.

The most effectual mode, however, of communicating to readers just ideas of the merits of the work will be to direct attention to the principal points which it is important for the physician to know, and for the invalid to bear in remembrance. In so doing, we shall not adhere strictly to the arrangement of the work itself, but advert to the different topics in such order as is most suitable for our present purpose.

In figure, Madeira is, according to Dr Pitta, an irregular oblong quadrangle; according to Mr William Johnstone, it approaches the shape of a parallelogram. As to its extent, statements vary.

Dr Pitta represents it to be about 150 miles in circumference; Dr Gourlay, only 120. Mr Johnstone found the mean length of the parallelogram to be, from west-north-west to east-south-east, about 37 miles, and the mean breadth 11 miles, containing an area of 407 square miles, or 264,480 acres. According to the most recent measurements by Colonel Paulo d'Almeida, given in the present work by Mr Driver, the greatest length of the island is 38¼ English miles; its greatest breadth, 12 geographical miles; and its circumference, 96 geographical miles. These measurements are believed to be the most accurate.

Concerning the discovery and early history of this island, various accounts are given, all of which partake more or less of the fabulous and wonderful. First, it is stated, that the island of Porto Santo was discovered in 1418, and, it is therefore added, that it is extraordinary that Madeira was not discovered at the same time, as it is seen from the former like a small black speck in the horizon. Madeira, it is said, was only known in the year 1419; and the most authentic account is supposed to be that which represents John Gonsalves Zargo and Tristam Vaz Teixeira, officers in the Portuguese navy, employed by Prince Henry, to have sailed on the 1st day of June 1419, from Algarve towards the south-west in search of an island, of which some hearsay accounts had previously reached them in a manner presently to be noticed. In a few days they reached the Island of Porto Santo, which, as already stated, had been discovered in the course of the previous year, and, continuing their course to the south-west, in a few days more they approached an island, densely covered with wood, and to which, consequently, they gave the name of MADEIRA.

The first sight of the island, covered as it was by luxuriant forests, is represented to have impressed the minds of the Portuguese adventurers with gloomy, superstitious, and, it is said, mysterious notions; and Zargo and Teixeira, the commanders, are mentioned in terms of commendation, for having, in defiance of these notions, sailed southward, and passed the point or headland of Santo Lorenzo, which they so named from their ship. Entering a spacious and sheltered bay, they cast anchor and landed. This was on the second day of July 1419. Like good Catholics, they were accompanied by two priests; and having solemnly returned thanks to heaven, for their safe preservation during their voyage, and the discovery of the island, they took possession of it in the name of the sovereign of Portugal.

This is supposed to be the authentic and true history of the first discovery of Madeira by the natives of Europe. Another story of a more mythic character, however, is also related by almost all those who have written on the subject.

According to this account, Madeira was first discovered in the year 1344, by an Englishman, who was accidentally carried thither under the following circumstances.

In the reign of Edward the Third of England, Robert Macham, or Machim, a gentleman who is designated by Alcaforado as of the second degree of nobility, became attached to Anna d'Arcet, or D'Arfet, the daughter, it is added, of a noble of the highest rank. It appears that in these days this presumptuous proceeding was a crime which demanded the most rigorous coercion and punishment. By the authority of a royal warrant, Machim was apprehended and thrown into prison; and on his release, he learned that the lady had been, against her inclinations, married to a noble, who had carried her to his castle near Bristol. A friend of Macham introduced himself into the family as a servant, and became the temporary attendant of Anna D'Arcet. A plan was concerted for the escape of the lady, and her restoration to her lover, who, without delay, conveyed her to a vessel, with the intention of escaping to France, then at war with England. In the hurry of embarkation and departure, they put to sea without a pilot; and as the season was most unfavourable, they encountered a violent tempest, by which, after missing the haven to which they were destined, the vessel was driven out to sea. After being tossed on the sea for twelve days, they descried in the horizon faint traces of land. As the vessel approached, and as the haze was dissipated by the rays of the sun, they had, at length, the assurance that they were near the coast. Trees in great luxuriance were observed to cover this land hitherto unknown. A reconnoitring party landed, and returned with a favourable account. The lady was conveyed on shore; and hasty accommodation was provided, while Macham and his companions proceeded to explore the neighbourhood of their place of debarkation.

In this occupation they had spent three days, when another unprosperous event took place. During the night a tempest had again arisen; and when they returned to the shore, the vessel was no longer visible. They concluded that she had been carried out to sea; and it is added, that she was wrecked on the coast of Morocco, where all on board were dragged into slavery.

This last calamity, of being left on an unknown island, without means of subsistence, is stated to have proved too severe for the lady. As soon as it was made known to her that the vessel had disappeared, she became speechless with grief, and, after a few days of silent despair, breathed her last. Robert Macham, according to the account, survived not longer than five days. His surviving friends interred him, at his dying request, in the same grave which had recently been prepared for the companion of his flight. Over the grave they erected a wooden cross, on which they carved an inscription which Machim had composed, recording shortly their adventures and sufferings; and subjoined a request, that if at any subsequent period Christians should visit the spot, they would in the same place erect and dedicate a church to Jesus Christ.

Having in this manner performed the last rites to the mortal remains of Anna D'Arcet and Robert Machim, the survivors put to sea in the boat which had been left, with the intention of returning as speedily as possible to England. In this expectation also they were disappointed. Either from want of knowledge in the art of navigation, and from inability to manage a small vessel in an unknown sea, or from the effects of currents and winds, they also were carried to the coast of Morocco, where, it is added, they were joined to their former shipmates in slavery among the Moors.

And here appears, as it were, the turning point which led to the re-discovery of Madeira by the Portuguese, after the interval of 26 years.

According to Alcaforado, John Gonsalves Zargo, a gentleman of the household of Don Henrique, being sent by that prince upon an expedition of discovery towards the coast of Africa, in the year 1418 or 1419, met in with and captured a Spanish vessel, filled with redeemed captives, on the way from Morocco to Spain. Among these prisoners was one John de Morales, an experienced and able pilot, whom Zargo detained, as being a person likely, from his knowledge of navigation, to be acceptable to his master, Don Henrique. Morales, who had learned, according to his own statement, the story of Macham and his discovery, from certain English captives whom he met with in the prisons of Morocco, communicated this account to Zargo, with such particulars of the situation and land-marks of the newly-discovered island as he had been able to collect from the companions of the voyage of Robert Macham.

Upon the information thus accidentally procured, according to the same authority, Zargo and Teixeira proceeded the following year, 1419, or the second year afterwards, and arrived at the expected island.

This story possesses all the characters of a myth; and it cannot, without a certain degree of violence to the established laws of probable evidence, be received among the facts of authentic history. It has been justly objected to it, that Morales, who performs so important a part in the drama, must have been either seventy-four years, or nearly that time, in captivity, if he received the story of Robert Macham and his companions from the survivors, who were still in the prisons of Morocco. The story is nevertheless related from the Castilian Chronicle by Galvano, and in substantially the same terms by Cordeyro[*] and Alcaforado. This, on the other hand, forms the principal circumstance in its favour, since it can scarcely be supposed that, if the Portuguese authors did not believe in its accuracy, they would repeat a narrative which tends to confer on an Englishman, rather than on their own countrymen, the merit of discovering the island, however accidentally accomplished. So strong is this persuasion, that in the Hall of the Government House was a painting of the alleged discovery of Madeira by Robert Macham, in 1792, when Sir George Staunton was there on the voyage to China.

The story also presents some discordant points. According to Cordeyro, whom some regard as the most accurate historian of the occurrences, the person to whom the English captives told their adventure, was not Morales, but Toã de Amores, a Spanish pilot. The same writer states, that the survivors of Macham formed a boat from the wreck of their vessel, or the trunk of a tree, and in this insecure conveyance committed themselves to the Atlantic. According to Galvano also, who details the story from the Castilian Chronicles, Macham survived, and, after having been for several years a prisoner among the Moors, reached Castile.

It would be unprofitable waste of time to inquire into the truth of a story which rests on evidence so uncertain. There is at Madeira, close on the sea coast, a rude town or village, which bears the name of Machico; and from this circumstance various Portuguese writers, and among the English, Bowdich, assign to the story some degree of credit. Machico, or Machaco, however, merely signifies unpleasant, troublesome, (*importunus*, *molestus*); and though it may not be easy to account for the application of this name to the maritime village of Madeira, the difficulty is not diminished by ascribing it to the name of Robert Machim or Macham. At all events, the connection between the name of the village in Madeira, and the English mariner, appears to be altogether accidental. Zargo and Vaz Teixeira are said to have discovered the remains of the two lovers, side by side, in a cavern, and, in compliance with the request of Macham, to have erected a chapel over them. This church, which Vaz Teixeira built, and dedicated to Jesus Christ, at Machico, though in a great measure remodelled, remains at the present day; and priests show the alleged chapel of Macham, and preserve in it, with pious affection, a small piece of wood, which is said to be the remains of Macham's cross.

When Madeira was first discovered in July 1419, it was a complete forest, chiefly of cedar trees, some of them of very great size, extending to the very sea-shore. Other trees were the laurel, til or[*] linden, vinhatico, (*Laurus Indicus*, Lin.), azevinho, aderno, teixo, pao branco, and dragon tree; and with these were intermixed such shrubs as the folhado, faya, urze, myrtle and uviera, forming a thickly-tangled impenetrable forest. No quadruped was seen, and it is said scarcely any amphibious animals. But over these woods soared various birds of prey; and on the huge volcanic rocks which line the shore, various aquatic fowls had taken up their abode. No inhabitants were found. Zargo and Teixeira returned to Portugal, with accounts of the extent, fertility, and beauty of the island, so favourable, that Don Henrique determined to colonize and cultivate it. According to the custom of the Portuguese government, he divided it into two captainships, Funchal and Machico; the former allotted to Zargo, the latter to Teixeira.

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[*] Historia Insulana das Ilhas a Portugal sugeytas no Oceano Occidental. Composta par Antonio Cordeyro de Campagnia de Jesu. Lisboa, 1717. The History of Cordeyro is, to a great extent, Dr Peacock inform us, abridged from a very voluminous manuscript work, never printed, written by Dr Fructuoso, a Monk of Terceyra in the Azores.

In the following year, 1420, Zargo began the plantation of Madeira; and being much impeded by the impenetrable woods of thick tall trees with which it was everywhere covered, in order to facilitate the operation of clearing the surface, he set the wood on fire; a most unfortunate and hurtful proceeding. The wood is reported to have continued burning for seven years; and so great was the devastation, that for a long series of years afterwards, the colony sustained much inconvenience from the want of timber. To this we shall have occcsion afterwards to advert, when speaking of the climate of Madeira.

The colonization of the island in the meantime proceeded. Zargo having speedily returned, built on the spot afterwards called FUNCHAL, from the quantity of fennel, a church dedicated to St Catharine, and around this houses of rude construction rose as occasion was required. The cultivation of the sugar-cane was soon after introduced, and the first mill was erected in 1452, probably in the Machico district, where it is said the first sugar was manufactured. Before the end of the fifteenth century (1499), there were upwards of 120 mills in different parts of the island.

In 1508, Funchal had increased so much, that it was made by royal warrant a city, with its camera equal in privileges to that of Lisbon. In 1514 it was made the seat of a bishop with a bishoprick, and in 1539 an archbishoprick; which latter dignity, however, it only retained until the creation of the archbishoprick of Goa in 1547. Zargo continued to exercise the office of governor for forty-seven years.

Sugar continued during the end of the fifteenth, and the whole of the sixteenth century, to be the great article of production and exportation. During the Spanish usurpation, however, a great change took place. The ignorant and savage tyranny of the Philips, with their unjust and oppressive government, fell with most destructive weight upon the cultivation and the trade of the island. Sugar, which was their greatest article of export, dwindled away to nothing after the year 1600. It is probable that part of this diminution is to be ascribed to the cultivation of the sugar-cane, and its manufacture in the different West India Islands. The sugar-cane is not a natural product of Madeira. It had been originally imported from Sicily to Madeira, soon after the discovery of the island. It was now conveyed from Madeira to Brazil and the West Indies; and since that event, so little is it cultivated in Madeira, that very little sugar is made in the island; and the supplies of moist sugars are received from Brazil by Lisbon, while the refined sorts are sent from England.

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[*] It is not easy to say what some of the trees here mentioned really are. Til, or tilo, is often used by Spanish and Portuguese writers, for the tile, or teil tree, *Tilia*. Dr Peacock gives as its synonyme, the name *Laurus Foetens*.

At present, Dr Peacock states, that there are not more than two sugar mills in the island, one at Praya Bay, the other of superior construction near San Martinho; at neither, however, do we understand that sugar is made. The canes are there employed in the manufacture of molasses and the distillation of rum.

After the sugar-cane ceased to be cultivated, the inhabitants of Madeira directed their attention to the vine, which had been imported soon after the sugar-cane, but was little attended to, till the latter was found to be unprofitable. During the seventeenth century, the grape became the main article of cultivation, and wine the principal article of export. Different sorts of vines are grown, of which the chief are the Bual, Sercial, Malmsey, Tinto, and Negrinha. What is called Madeira, is produced from several different sorts, of which the Verdelho, Bual, Bastardo, and Negrinha are the chief.

The appearance of Madeira is decidedly that of a mountainous island. The mountains are so elevated, that their summits are generally covered with clouds, and in some points a single jagged peak raises itself above them. Nearly the whole coast consists of a succession of cliffs or abrupt rocky headlands, rising as it were from the bottom of the sea; the most remarkable of which is Cape Girao, which rises more than 1700 feet above the sea, and which is said to be the loftiest rock rising immediately out of the deep, in the world. The cliffs in general are more precipitous on the north than on the opposite coast. The whole island presents the appearance of a mass of volcanic mountains, riven into slopes and ridges all tending seawards, and intersected in various points by ravines and fissures. These mountains are terminated in jagged elevated peaks, the highest of which, Pico Ruivo, is more than 6100 feet above the level of the sea.

Voyagers, on approaching Madeira, come first in sight of the island of Porto Santo, which is often mistaken by the stranger for Madeira itself. This island is forty miles distant, some make it fifty, and to the north-east; and from it Madeira, as already stated, may be seen like a black speck in the horizon. As the vessel advances on her course, this speck gradually enlarges, until the east coast of the island comes completely into view, forming, by a long low broken line of cliffs, the headland called *San Lorenzo*. Then appear on the left a cluster of huge rocks, the *Desertas*, one of which, standing apart on the northern extremity, appears at a distance like a ship in full sail. The distance between this rock and Point San Lorenzo is nine miles; and the channel between them is the route followed by vessels proceeding to Madeira.

Steering westward, the maritime villages of Machico and Santo Cruz come into view, both situated at the outlets of ravines. Then rounding Cape Garajao, known to the English by the name of Brazen Head, the spectator beholds before him the bay of Funchal, smooth and unruffled as a lake, if the weather be calm; with the city of Funchal placed in its remote recess.

Funchal is not a handsome city; but, compared with Lisbon, Oporto, or any other town in the mother country, it is clean; and the houses being of white colour, give it a lively appearance. The streets are narrow, and in many parts steep, paved with small pebbles, and without parapets. It contains no buildings deserving description. The residence of the governor and of the English consul are large; the houses of the merchants in general are handsome. All the large houses are provided with balconies.

The cathedral, though a fine building, has in the interior nothing particular,—the paintings and statues, which are usual in Catholic places of worship, being here of little value. The English church, which was built by subscription, at the cost of more than L.10,000, is a small but neat edifice, situated near to the Rua de Carreira, the principal street of the city, and surrounded by trees, and adorned with flowers. At a short distance from the chapel lies the burying-ground, in a more secluded situation. The population of Funchal consists of about 25,000 persons, including among about 100 English families resident on the island.

The population of Madeira, according to Dr Pitta, was, in 1812, 90,000 persons. The population of Madeira at large, including the island of Porto Santo, amounted, in 1836, according to the census then taken, to 115,446. As the entire population of Porto Santo at that time was 1618 persons, this makes the population of Madeira to be 113,828. At the same period, the population of Funchal amounted to 28,653. According to a census taken in 1847, the population of Madeira and Porto Santo amounted to 117,000, showing an increase only of 1554

persons in the course of eleven years, or about 141 persons annually. This slow increase is ascribed to the drain upon the population of the island, caused by emigration to the West Indies and Brazil. Subsequent to the proceedings which ensued on the efforts of Dr Kalley some years ago, many persons converted to his opinions, dreading the iron hand of the Inquisition and the priests, emigrated to the West Indies and the United States.

The number of persons between the ages of twenty and thirty, in 1836, was 17,766, and between the ages of thirty and forty, 13,494, exhibiting, says, Mr Driver, a decrease between those ages of 4272. Mr Driver appears to infer that this decrease is greater than it is elsewhere or naturally. But we perceive no means taken to ascertain whether this be the fact or not.

This diminution, he adds, can only be accounted for by the poor diet of the lower classes, which consists of coarse bread, vegetables, and a little fish, and rarely or never animal food. What, it may be asked, is fish? Is it not animal food? It is evident Mr Driver means beef and mutton, and reserves the distinction of animals only for sheep and oxen. It appears to us doubtful, whether, if the fact be as he represents it, the explanation would account for it. It is certain, that in many countries of Europe, and especially in Spain and Portugal,—we may add Italy and France,—the labouring classes rarely eat either beef or mutton, and subsist mostly on bread, chiefly ryebread, milk and whey, butter, cheese, salt fish, potatoes, and some of the common leguminous plants and pot-herbs.

The great cause of sickness, bad health, and early death, among the working classes in all countries, is hard labour and exposure to the inclemency and vicissitudes of the weather. Men employed in agriculture, seafaring occupations, and similar pursuits, are often obliged to work extremely hard in all sorts of weather; they are overheated, and thoroughly wetted; often they sleep or rest on the ground, and in wet garments. These circumstances alone are sufficient to induce disease, and, in a large proportion of instances, they do induce it, either by their intensity, or by their frequent repetition. And when to these causes is added the practice so common in all countries, but especially in northern countries, of having recourse to the use of spirituous liquors of various forms, under the delusive idea of enabling them to endure great labour, and withstand the hurtful influences of the weather, it is not difficult to perceive whence the great body of ailments and the amount of mortality at the middle period of life among the working classes proceed.

According to Mr Driver, the women in Madeira are greater sufferers from this and similar causes than the men. They marry early, and have numerous children; but besides this, they are employed in cutting wood on the mountains for fuel, and this they carry in heavy loads on their heads to Funchal. This firewood they dispose of in the city, and having purchased some dried fish, return to their homes, probably at some distance in the hilly parts of the island. This severe labour, with meagre food, and warmth of climate, he represents to make these females old in constitution, while young in years. To females of the higher class, a source of broken health is, according to the author, the sedentary life which they lead, especially in summer, when they rarely go out of doors except to go to church, and then probably in a palanquin.

The district of Santa Anna, on the north-east side of the island, he regards as the most unfavourable in regard to health and longevity; since, among a population of 14,799 persons, there are 2566 between the ages of twenty and thirty, and only 1633 between the ages of thirty and forty; while not more than 128 attain the age of seventy. The city of Funchal does not share nearly so much in this decrease of numbers at an early age as any of the other parishes. The difference there is only 19 per cent., while the other districts exhibit a decrease of 24 per cent. This he regards as a clear proof that the comparatively rare occurrence of longevity depends in a great measure on the diet.

It is really difficult to say to what extent the conclusions now given are well-founded. That meagre and scanty diet may be a cause of disease and mortality, it would be idle to doubt. But we think it is quite competent to doubt, whether they are truly causes so potential as they are here represented to be. It would have been desirable to have received some information more specific and pointed regarding the habits of the people in the high mortality districts, and, above all, regarding the prevalent and mortal diseases.

It is a circumstance not undeserving notice, that while the author represents hard labour and meagre fare to be the cause of early old age among the female population of the island, he, a few pages after, states that, though the men are sober and inoffensive, yet, from the idle and sedentary life which they lead, they have an aged appearance when young.

As to articles of food, fish is said to be good, and in great variety. Poultry is plentiful. Beef of excellent quality is obtained from a small breed of mountain cattle. Mutton is indifferent. Of game, partridge, snipes, woodcocks, and quails are mentioned. The hare and pheasant, it is said, cannot be naturalised. Vegetables of all kinds are abundant; and peas and all descriptions of salads may be obtained every day in the year. Potatoes and onions, to a small extent, are exported to the West Indies.

In entering on the subject of climate, it is necessary to take into consideration the state of the vegetable productions on the surface of the island. The fire which, it has been already said, was kindled among the woods, is said to have burned with such violence, that the adventurers were compelled to take refuge in their ships in order to escape the scorching heat to which it gave rise. The occurrence of this conflagration is recorded by Cordeyro after his principal authority Fructuoso; nor is it doubted by any. Dr Peacock also thinks that there is no reason to doubt that it continued burning during seven years; but he considers the combustion during the latter part of that period to have been of a slow smouldering character, confined chiefly to the roots of the trees, and spreading along them by means of the light porous soil in which they grew.

Certain it is, that by far the greatest portion of the indigenous wood of the island has disappeared. The cedar, which was once abundant, is now no longer to be found. Of the dragon-trees not more than six or seven are to be found in the whole island. The til, the vinhatico, and the folhado, the two first of which furnish valuable timber for the arts, are rapidly disappearing. The tree heaths (*Erica arborea*) are found of considerable size, and in great numbers, in the mountains; but, instead of the non-deciduous trees, which alone are indigenous in a engy-tropical island, very generally the deciduous trees of more northern latitudes have appeared. Everywhere, for instance, has the Spanish chestnut been planted, supplying an important article of food for the people, and furnishing the north of the island with support for the vines, which are trained on the chestnut trees. The oak, the walnut, the plane-tree, have been extensively introduced, both as ornamental and as useful timber. The pine grows rapidly in the mountains, and has also been extensively planted. The larch has been tried, but does not thrive. All the trees of China, Japan, and Australia, it is said, are found to grow luxuriantly, particularly at an elevation of about 2000 feet above the level of the sea.

A fact well understood is, that though there is always a very extensive range of climate within which the same trees will flourish, yet no length of time will tend to acclimatise them, or so to modify their periods of foliation, flowering, and fruitbearing, as to adapt them to the new conditions of the seasons and climate to which they are transferred. The custard apple (*Annona squamosa*) and its congeners, the natives of semi-tropical regions south of the equator, bring their fruit to maturity in Madeira in the winter, and change their foliage in the summer, without respect to the reversal of the seasons in passing the line. Trees also, which are deciduous in a northern climate, continue deciduous when removed to a locality where all the indigenous trees are evergreen. They shed their leaves in autumn, as with us, and resume them, after the accustomed period of repose, in the spring, at times, not much accelerated by the increased influence of warmth and sunshine. For instance, the foliation of the Portuguese oak, which is nearly the first in order, takes place in the beginning of March. The plane-tree and the fig-tree follow at the beginning of April, while the Spanish chestnut is found almost leafless in the beginning of May. A stranger beholds with surprise in Madeira the apparent sluggishness of vegetation in the spring, under the operation of an amount of heat and light which, in England, would be sufficient to clothe, at the end of winter, whole forests with almost instantaneous verdure.

Though the destruction of the forests immediately after the first discovery of the island, to a degree so great that it has never recovered from the loss, so far as the production of wood is concerned, was an evil, it has nevertheless been attended with the beneficial effect of rendering the soil and air more dry, and the climate less humid. An insular climate is naturally more humid than one that is inland; and the small size of Madeira must have ensured it against any great degree of dryness. The removal of so much wood, which must have acted very much as a sponge, has tended greatly to desiccate the surface, and probably to render it a more salubrious habitation than otherwise it would have been. Dr Peacock observes, that the leaves of many trees, especially of the laurel tribe, by the smoothness of their surface, cool rapidly by radiation when the sky is clear; and the dew being consequently profusely deposited upon them, they collect water in great abundance from the atmosphere. When the island was first discovered, in the beginning of the fifteenth century, and for many years afterwards, while the northern mountains were covered with evergreen trees, the river Socorridos, the largest in Madeira, which runs through the Curral, was sufficiently deep to float timber to the sea, where it enters near Cama dos Lobos (the Bed of Wolves), a village about seven miles west from Funchal. It is now reduced, when not suddenly flooded, to a mere stream, almost lost in the loose rocks which occupy its channel.

The circumstances now mentioned render water so necessary for the purposes of irrigation, that it is collected in the mountains by artificial means, and conveyed in different directions by the *levadas*, a species of aqueducts carefully and strongly constructed of stone, to the estates of different proprietors, in certain definite quantities and proportions regulated by a particular code of laws. As might be anticipated in such circumstances, though the supply of water thus distributed is intended to be distributed upon equitable principles, yet, from many different causes, disputes arise;

and it is said they form a most fertile subject of litigation. Water in Madeira becomes equivalent to money; and any one who imagines that he is defrauded of his just proportion is sure to have recourse to legal measures to enforce his claims.

The atmosphere in Madeira is liable to become unusually hot and dry under the influence of the wind called *Leste*, which is said to visit the island from the coast of Africa. This wind has qualities opposite, it is said, to that which, proceeding from Africa to Italy and Sicily, is called by the Italians *Sirocco;* and Dr Mason maintains that it is of the utmost importance to have clear ideas of the difference. This is probably the more necessary, that both Dr Gourlay and Dr Pitta have described, under the name of *Sirocco*, the hot dry wind of Madeira (p. 32).

The wind called by the Italians *Sirocco,* which visits Naples and the south of Italy from the opposite shores of the Mediterranean, is hot, moist, and relaxing.* On the contrary, the wind denominated by the Portuguese *Leste* is essentially hot and dry, and of a highly stimulating nature; so that, by means of its exciting qualities, it soon exhausts persons in health. The *Leste*, Dr Mason represents to be similar to the *samiel* or *simoom*, a burning pestilential blast, extremely arid, which frequently springs up in the deserts of Arabia, and rushes forth with unrivalled force, involving whole pillars of sand. In proof of the fact that it is the same wind, Dr Mason states, that, on the 6th and 7th of November 1834, he observed the furniture to be covered with an impalpable reddish powder. On the 6th, the appearance of the atmosphere was very peculiar. The wind was east-south-east; the valley was universally covered by mist, so that neither sea nor mountains could be seen, though the former was only half a mile, and the latter one mile and a-half distant from the residence of the observer. The sun appeared as if viewed through a smoked glass, and very pale, a phenomenon which continued the entire day. The night was dark, no stars being visible. The maximum power of the sun during the day was only 83°; whereas, on the previous day, it was 130°; on the 7th, it was 100°; and, on the 8th, it amounted to 136°. This was remarked by the inhabitants to be an unusual occurrence. The 7th was very cloudy, and some rain fell. The night was bright and unclouded, but no deposit of dew was observed.

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* Testimony does not in all instances agree even in the direct sensible properties and physical effects of the sirocco. A short account of its effects on the human body was given by Patrick Brydone, in 1770, in his Letters on Sicily and Malta. He adverts chiefly to its effects on the mental and corporeal feelings, represents it to be a wind depressing the spirits, destroying alacrity and energy of mind, and causing intellectual stupidity and dulness. He allows that it is a warm wind, and mentions that the thermometer is raised by its advent. "The spring and elasticity of the air seems to be lost; and that active principle which animates all nature appears to be dead." The electrical tension of the air, also, he adds, was destroyed during its presence, and it was most unfavourable for electrical experiments. This might arise from the humidity of the air. Sea bathing he found the best antidote against the effects of the sirocco.—A Tour through Sicily and Malta, Letter I., p. 10. Two vols. 8vo. London, 1776.

On the other hand, in a sort of song or ballad published about the same time, the first line is,—

"When the chill sirocco blows."

Lastly, Lord Byron, in one of the most harsh and turgid lines he ever wrote, has the following:—

"Death rides upon the sulphury siroc."

Spallanzani, in his Travels in the Two Sicilies, mentions the *Sirocco,* or south-east wind, but only in connection with volcanic commotion.

The same phenomena occurred at sea during the same days, and were observed by passengers on board the New Phœnix, when 180 miles distant from Madeira. The rigging and decks of this vessel were covered by an impalpable red sand, so abundant as to render it necessary to use means of clearance; and the shipping in Funchal harbour were also covered by the same deposit. The wind was east. The sand must have been carried over 200 miles of sea. No specimen was procured.

In order to prove the hot dry nature of the *Leste*, the author quotes from the description given by Dr Heineken. The latter author appears to proceed, like Dr Mason, on the principle that the sirocco of Italy is a more humid wind. If it be so, it is only in degree, and in certain parts of Italy; for in Sicily it evinces all the effects of a hot dry shrivelling wind, drying up the leaves of plants, causing rents in furniture and timber generally, warping furniture, and producing on animal bodies those uncomfortable sensations which are the results of excessive dryness in the atmosphere.

In one point these two observers do not agree. Dr Heineken denies the high temperature caused by solar radiation during the *Leste*, which, according to some, amounts to 130° and 136°. Dr Mason, on the other hand, maintains, that Dr Heineken merely calls in question the accuracy of the observations of others, without adducing any proof of the absence of this high solar temperature from his own observation. Had he done so, Dr Mason maintains that, with a thermometer exposed to the solar rays in the manner directed by Mr Daniel, he must have seen in the course of four years' observation, that the instrument did in such circumstances indicate a temperature of 130° or upwards. It is certainly a direct proof of the correctness of his statement, that Dr Mason observed that on the 22d October 1834, on which day occurred the most intense *Leste* which he observed during his residence in the island, the degree of solar radiation indicated by the thermometer arise to 138°.

If we take 85° for the temperature of the air in perfect shade, and subtract 45° of dryness in the thermometer scale, the results are as follow.

Temperature of air in the shade,	85°
Dew Point,	40°
Degree of dryness in the thermometer scale,	45°
Degree of moisture in hygrometer scale,	·226
Elasticity of vapour,	·280
Weight of vapour in grains in one cubic foot in atmosphere,	2.965
Weight of vapour which the temperature in the shade would support if saturated,	13·081
Difference in quantity of vapour required to produce saturation,	10·116

The air of Madeira, is, indeed, as shall be seen, in ordinary circumstances, very moist. From the tables given us, as constructed from the observations of Dr Mason, it appears that the mean dryness of the whole year is 3·91, and the mean maximum dryness for the whole year is 5·05, It may, therefore, be said, that in ordinary circumstances, when *Leste* does not prevail, the dryness ranges between 3·91 and 5·05. When *Leste* prevails, however, very different is the result. The maximum dryness of *Leste* atmosphere is in January and February indicated by 9°, in December by 13°, in March by 14°, in June by 15°, and in October by 22° of the hygrometer.

It further appears from the journal of Dr Mason, that in the instance adverted to in October 1834, the hygrometer had indicated early in the morning of the 20th only 5°; but all of a sudden, and rapidly, between eight and nine in the morning, the day after the *Leste* had come on, the instrument indicated 20°, and in the course of the day 21°, 24°, 26°, at noon, 23° and 24°. On Wednesday, it began to descend to 19°, 18°, 17°, 16°, 14°; but on the morning of Thursday, was again up at 20° and 21°; and only at six in the evening had it fallen to 7°. The *Leste* had abated about four p.m., that is, about three hours before this change in the hygrometer was perceived.

Parching as this state of the atmosphere is to everything animate and inanimate, it is said by Dr Mason to be by no means too dry for a great proportion of the invalids sent to Madeira; and he adds, that it is only during the prevalence of the *Leste* that they feel the cheerful influence of climate, and express the sentiment, that if they could live in a perpetual mild *Leste*, or, in other words, in a warm and equally dry atmosphere, they would soon recover. This, we are led to understand, when taken in connection with what is stated immediately afterwards on the effects of this wind, is to be regarded as a proof that the sensations of patients as to this wind are not entirely fallacious, but are to be taken as indications, that the ordinary atmosphere of Madeira is to them greatly too much loaded with moisture.

"It amounts almost to a proverb," says Dr Mason, "among the residents of the island, that those with whom the *Leste* agrees seldom recover; and accordingly, such cases are set down as the most unfavourable." It is obvious, he thinks, that all those persons with whom the *Leste* agrees ought not to have been sent to Madeira; since, under the most advantageous circumstances, they will enjoy not more than ten or twelve days calculated to give them a chance of ameliorating their condition; and the general conditions of the climate being directly the reverse of what they require, they of necessity get rapidly worse, or make not the slightest improvement. This, Dr Mason thinks, is owing not to the malignity of the case, but to the individual being placed under conditions the most unlikely to promise any benefit from the effects of the climate. From his own observation, he thinks that as soon as any invalid finds that he becomes better during the prevalence of a *Leste*, it would be advisable for him, without delay, to seek a drier climate. On the other hand, invalids who feel oppressed and languid during its influence, are those who are likely to derive benefit from a residence at Madeira, and may naturally hope to be restored to health, as far as their organic condition will allow of being brought into a favourable state.

Conversely, Dr Mason thinks it natural to expect that those invalids who have visited the coast of the Mediterranean for the sake of health, and who find the *Sirocco* agreeable to them, had better proceed to Madeira, where, he says, they find a mild and permanent condition of atmosphere similar to the Sirocco which visits Naples and the south of Italy, being essentially warm and moist.

During the prevalence of a *Leste*, the residents shut every door and window to prevent the entrance of dry air.

It is clear, that, as has been already stated, the climate of Madeira is very moist. Iron in every form undergoes speedy oxydation. Powders, as opium, squill, and similar substances, soon run into moist aggregated masses. Neutral salts speedily deliquesce. Gloves, shoes, and other articles made of leather, soon become covered with cryptogamous plants. Silks become spotted and unfit for use. Pianofortes and similar instruments require frequently to be re-tuned; and the screws of violins and guitars become so tight as to be almost immovable. Indeed, vegetation, it is stated, could not flourish unless the atmosphere were saturated with moisture; as frequently during the dry season a shower of rain does not fall for three, four, or even six months in succession. (P. 31.)

Rain, indeed, does not fall in any great abundance at any period; and when, during any season, rain falls to a greater amount than usual, the occurrence is marked as unwonted and extraordinary. The year 1826 is recorded as one in which rain fell to a great and unwonted amount; and 1834 was also distinguished by a large amount of rain. The number of days on which any rain falls here is set down by all previous writers on the climate of Madeira at seventy-three. During the last year, however,—we understand 1834,—the days were one hundred and one, giving twenty-eight days more than the mean of a series of years.

The coldest months of the year are January, February, and March, during which the winds generally blow from north-north-east; and in the mountainous parts of the island heavy falls of snow are frequently liable to take place. During some seasons this state of weather may be prolonged to May, or the end of May according to Dr Gourlay. During the winter months the thermometer ranges from 57° to 65°, its medium in the shade being from 60° to 64°; and during this period it descends below 57° only when northerly winds prevail in the heights, with falls of snow. The warmest months of the year are July, August, and September, when the heat sometimes becomes intolerable. During the summer months the thermometer ranges from 68° to 76° in the course of the day, the medium heat indicated being from 73° to 75°. It may rise to 80° and upwards; and, as already mentioned, during the prevalence of the hot wind *Leste*, it ascends to 85°, 90°, 100°, 130°, during which latter temperature the heat is sufficient to melt wax in a few seconds.

From the account given by Dr Mason we subjoin the following numbers.

	Mean Temperature.	Range in the Shade.	
January	60·24	55°	65°
February	61·12	55	69
March	63·43	53·5	71
April	65·39	58	75
May	67·97	61	77·5
June	69·44	63	80
July	71·68	66	80
August	72.78	66	80
September	72·16	66	79
October	69·49	62	77
November	65·45	57	73
December	64·25	55	72

Thus it appears, that in August the atmospheric heat attains its maximum, and after that period it gradually descends to the temperature of December and January.

Though, as has been already stated, the residents shut doors and windows during the prevalence of a *Leste*, yet, in the ordinary condition of the atmosphere, they seem to adopt no precaution against extreme vicissitudes of this kind. Dr Mason observes that if they would shut their doors and windows before the damp air enters, towards evening, they would in a great measure free themselves both from the sufferings which the practice of open doors and windows produces, and from the danger likely to arise from exposing themselves to constant currents of cool humid air. Guided only by their feelings, they open the windows, and complain of being oppressed by the heat, perspiring freely. As during the day, when the temperature is at its maximum, they never complain of this oppression, Dr Mason infers that what they feel is not produced by heat, but by the very humid condition of the atmosphere, which greatly retards pulmonary exhalation, so as to require an increased discharge from the skin. This discharge meeting with great tension in the vapour, does not assume the state of insensible perspiration so rapidly as in the middle of the day, but is condensed on the surface in the form of sweat. In houses in which the windows and doors are regularly closed at a proper period, this oppression and its accompanying phenomena were not experienced.

The land and sea breezes, which are the N.E. and S.W. respectively, are the great means of moderating the temperature, and upon these regularly Dr Mason states, the salubrity of Madeira depends. Whenever any remarkable or continued variation takes place in these currents, the health of the inhabitants suffers more or less severely. This depends, Dr Mason thinks, on the surrounding medium being charged with the effluvia of animal and vegetable matter in different stages of decomposition which, in consequence of the high temperature and the humidity, takes place and proceeds with great rapidity. No measures are adopted to prevent and remove the accumulation of refuse and filth which arises from the assemblage of twenty-five thousand persons; and the local atmosphere is soon loaded with impure exhalations, when the land and sea breezes cease to blow; the latter is represented to dilute the poison, while the former conveying it seaward renders it comparatively harmless on the human frame. The multiplied tanks also which are kept to irrigate the gardens, and even supply water for other purposes, tend to vitiate the atmosphere. The water is rarely renewed; the tanks are not cleaned for months, nay, it appears, not for two years; (p. 41); and the result is, the water becomes foul, giving birth to animalcules and other noxious productions. These tanks, according to Dr Mason, are a prolific and constant source of miasma and offensive effluvia, and produce on the human frame most deleterious effects during the summer and autumn. The Portuguese are so ignorant and prejudiced, that it is impossible to make them move out of the path in which they have been accustomed to tread, and to make them understand that they are rendering the air of Funchal exceedingly unhealthful. Dr Mason's landlord assured him that the tank attached to his house had been kept full for two years, had not been emptied or cleansed, and that at the end of that period the water was perfectly fresh and good. (P. 41.)

The usual explanation of the cause of the land and sea breeze is given. The sea breeze, it is known, is the effect of the local atmosphere over the land becoming more heated by the rays of the sun than that over the sea. Hence the air of the sea being rendered or preserved cooler, blows over the land, carrying along with it the vapour with which it is charged. This is during the day, the sea breeze beginning to blow soon after sunrise. The atmosphere over the land continues more rarified till after sunset, when it undergoes the cooling process more or less rapidly. Then takes place the phenomenon of the land breeze.

The land and sea breezes alternate with great regularity during the summer months. During the rainy seasons they are irregular. If, indeed, from any cause, they pass over the regular time of their appearance, more or less rain generally follows, accompanied with strong winds. As soon as the land winds commence, the hygrometer begins to indicate an accession of humidity, which goes on increasing until after the clouds have passed over the valley, from the mountains to the sea. This generally takes place about eleven P.M., when the hygrometer either rises or remains stationary; so that at six A.M. a greater degree of dryness is indicated, because the land wind, which descends from the elevated parts of the island, has become dryer during the night, and the dense clouds have passed over the sea; a great mass of vapour also being precipitated in the form of dew. In Funchal the humidity progressively increases from four P.M. to a late hour; so that from five P.M. to eight P.M. is the most oppressive period of the day, and, therefore, the least suitable for an invalid to expose himself, either in the open air or at windows, —a custom too prevalent, as already stated, among all classes in Madeira.

The following observations on the state of the sky and atmosphere during the *Leste* show what the invalid may expect.

"During a *Leste*, the sky presents a peculiar appearance; and, although perfectly cloudless to the eye, and of a transparent light and greyish-blue colour, yet no doubt can be entertained that this seeming free expanse is formed of one continued sheet of cloud, at a great elevation; as the direct rays of the sun do not produce so great an effect upon a thermometer as during the ordinary state of the sky, when large patches of clear light blue are to be seen. This will be found to be conclusively proved, upon a reference to the tables.

"I may also state that rain generally falls within twenty-four hours after the *Leste* has altogether ceased; and that I have seen a very strong precipitation of dew, three hours afterwards, the atmosphere being reduced from 17° to 7° of dryness on my hygrometer; and at seven the following morning to 2°; while the plants and shrubs were covered with dew.

"Nothing can demonstrate more clearly the law which regulates the diffusive power of vapours; namely, that the lower their specific gravity, or the lower the temperature at which condensation would take place, the greater their diffusive power, and, consequently, the more rapid the evaporation. Thus we find, a few hours after the *Leste* has ceased, the whole atmosphere, from being intensely dry, becomes surcharged with humidity.

"From the rapid evaporation, the temperature of the air immediately over the ocean becomes proportionally reduced: the caloric being rendered latent, during the conversion of water into an elastic form of a comparatively high tension.

"By the law previously stated, as regulating the sea breezes, this cold air, almost saturated with humidity, rushes over the land. It there meets with air at a much higher temperature, and capable of supporting a still greater weight of vapour; and, although the air over the land is not so near the point of full saturation as that over the ocean, it acquires absolutely a larger quantity of vapour in point of weight; and on its ascent, in coming in contact with air at a lower temperature, we see clouds rapidly formed. This arises from the fact, that the tension of the mingled vapour always exceeds the tension belonging to the mean temperature; a result which arises from the mixture of the air at different temperatures, producing an excess which must be precipitated either in the form of heavy dew or rain."—Pp. 48, 49.

In the tenth and eleventh chapters, Dr Mason considers the physical and physiological relations subsisting between the human body and the atmospheric changes most common at Madeira, and inquires into the effects produced upon the human body by the various changes to which the atmosphere is liable, as it is influenced by heat, and its power of holding moisture in suspension. The conclusions at which he arrives are given in the following sentences.

"1.—All temperatures inferior to that of the body will not alter the quantity of oxygen in a given quantity of atmospheric air, which, in the act of respiration, is always raised to nearly the same temperature as that of the body.

"2.—If the temperature of the air be higher than that of the body, the quantity of oxygen, in a given space, will be proportionally diminished.

"3.—During respiration, air, below the temperature of the body, will act as a refrigerator; the quantity of heat withdrawn being proportionally greater.

"4.—The quantity of oxygen, in a given portion of atmospheric air, will vary according to the density of the atmosphere, which is greater when the barometer is at 30 inches, and less in proportion to every diminution of pressure.

"5.—In a given portion of atmospheric air, more oxygen will be brought into contact with the lungs at the level of the sea, than in a mountainous country; the quantity gradually decreasing with every elevation above the level of the sea.

"6. The hygrometric condition of the atmosphere has no influence in diminishing or increasing the quantity of oxygen in a given portion of air, when in contact with the lungs; the air, in a healthy condition of the organization, being fully saturated, and consequently existing always under one expansion.

"7.—Pulmonary exhalation and cutaneous insensible perspiration or evaporation are to be regarded as physical phenomena; and, consequently, are increased or diminished by physical causes.

"8.—Every other condition being equal, perspiration by evaporation will be increased in proportion to the dryness of the atmosphere, or to its distance from the point of saturation.

"9.—Every degree of temperature inferior to that of the body will act in increasing the dryness of atmospheric air in immediate contact with the body; the heat changing its hygrometric condition, and rendering it drier, in proportion as the temperature of the air is further removed from that of the body.

"10.—The agitation of the air promotes insensible perspiration from the skin, in proportion to its dryness and velocity.

"11.—A rarified state of the atmosphere increases perspiration by evaporation, both from the skin and lungs.

"12.—Every other condition being equal, both pulmonary and cutaneous evaporation are impeded in proportion as the air comes nearer to the point of full saturation.

"13.—Both are decreased, in proportion as the temperature of the atmosphere approaches to that of the body.

"14.—Both are impeded by a dense elastic condition of the atmosphere, indicated by a high barometric pressure.

"15.—Every other condition being equal, insensible perspiration by the skin is diminished in proportion to the tranquillity of the air.

"16.—Both sensible and insensible perspiration are entirely suppressed, provided the air be of the same temperature as the body, and be fully saturated with vapour.

"17.—Sweat, or perspiration by transudation, being a vital function, and acting as a regulator to the quantity of fluid given off from the skin and lungs, takes place in exact proportion as perspiration by evaporation from the skin and lungs becomes impeded.

"18.—This function is very little affected by temperature from 32° to 68°, Fahrenheit; but, from 78°, Fahrenheit, it takes place more rapidly than the increase of temperature would indicate, acting in proportion to the diminution of insensible perspiration from the lungs and skin.

"19. When, under the ordinary condition of the atmosphere, the body is at rest, this secretion, as soon as formed, is converted into vapour, being added to perspiration by evaporation.

"20.—When, during any exertion of the body, under ordinary circumstances, it is secreted in greater quantity than the hygrometric condition of the air will support in the state of vapour, it appears on the surface in the form of sweat.

"21.—The same phenomena will take place when at rest, provided the air be so charged with vapour as greatly to impede pulmonary and cutaneous exhalation.

"22. When transudation or sweat covers the whole body, perspiration by evaporation from the skin is suppressed, the contact of atmospheric air being precluded from the skin.

"23.—When this is the case, evaporation will go on from the surface of the fluid secreted, and that in proportion as the temperature and hygrometric condition of the atmosphere favour evaporation.

"24.—The cold produced by this process will be very great, heat being abstracted from the body in proportion as its temperature is above that of the air, every grain of sensible perspiration requiring as much caloric to convert it into vapour as would raise 1000 grains of water one degree.

"25.—The rapidity with which this reduction of temperature takes place will be in proportion to every cause which promotes evaporation.

"26.—Caloric is abstracted from the body in proportion to the velocity of the air, whatever be its hygrometric condition, and more so in proportion to the lowness of its temperature compared with that of the body.

"27.—Refrigeration takes place equally in dry and in humid air.

"28.—That sensation of cold which we experience in humid air must be attributed to some other influence than that which, in this condition of the atmosphere the mean temperature exerts upon the system."—Pp. 145–48.

In the twelfth chapter is given a series of observations on the effects of the *Leste,* or Dry Wind, on the animal economy. These observations the reader will find in the Medical Intelligence, where they seem to be most appropriately placed.

The following comparative view of the chief differences between the climate of London and that of Madeira will convey some idea of the suitableness of the latter island as a residence for pulmonary and other invalids.

"CLIMATE OF LONDON.—1. The air inspired will abstract a larger quantity of caloric from the body, in proportion as 50° is lower than 66°, in each act of respiration.

"2.—The quantity of oxygen in a given space is less in London, as 29.881, the mean height of the barometer there, is less than 30·030, its mean annual height in Madeira.

"3.—Respiration by evaporation, both from the skin and lungs, is greater in London—the distance from the point of saturation being the same—in proportion as the number of degrees, between the mean temperature of Madeira and that city, differs from that of the body. The mean temperature of London is capable of holding 4·535 grains per cubic foot of aqueous vapour; whereas the mean of Madeira will hold 7·447 grains; and moreover, the atmospheric pressure is less, in the latter locality.

"4.—The agitation of the air, either through the medium of currents or exercise, in regard to promoting insensible perspiration from the skin, is greater in London, in proportion as its mean dryness, in relation to the functions of the body, exceeds that of Madeira.

"5.—Perspiration by transudation is less in London, in proportion as perspiration by evaporation is increased.

"6.—When the surface of the body becomes covered with sensible perspiration in London, it is more likely to be followed by fatal consequences; evaporation being greater, and the temperature of the air less, than at Madeira; consequently, more caloric will be abstracted from the body, and with much greater rapidity. Hence the necessity of avoiding currents of air, and changing the body linen.

"7.—Caloric will be more rapidly abstracted from the body, and in greater proportion, according to the velocity of the wind in London; the mean temperature being further removed from that of the body, than the mean temperature of Madeira.

"8.—The influence of light is less in London than in Madeira.

"9.—In its effects on the animal economy, our summer season will approach to the Madeira climate; being slightly modified by temperature and hygrometric condition."

"CLIMATE OF MADEIRA.—1. The air, inspired, will abstract less caloric from the body in each act of respiration in proportion as 66° is higher than 50°.

"2.—The quantity of oxygen in a given space, at the level of the sea, is greater in Madeira, as 30·030 inches, the mean height of the barometer there exceeds 29·881, its mean annual height at London.

"3.—The distance from the point of saturation being equal, perspiration by evaporation, both from the skin and lungs, is less in Madeira, in proportion as 66°, its mean temperature, approaches that of the body, being capable of supporting 7·447 grains of aqueous vapour per cubic foot, and the atmospheric pressure being greater.

"4.—The agitation of the air, through the medium of currents or exercise, promotes insensible perspiration by the skin, in a less degree in Madeira, in proportion as its humidity, in relation to the functions of perspiration, exceeds that of London.

"5.—Perspiration by transudation is increased in proportion as perspiration by evaporation is diminished.

"6—When the surface of the body becomes covered with sensible perspiration in Madeira, it is not so likely to be followed by dangerous results as in London, evaporation being less, and the heat of the air greater in the former than in the latter locality, less caloric will, consequently, be given off from the body, and with much less rapidity.

"7.—Caloric will be less rapidly abstracted from the body in Madeira, and in less quantity, according to the velocity of the wind, the mean temperature approaching more or less to that of the body.

"8.—The influence of light is greater in Madeira than in London.

"9.—The temporary climate produced by the *Leste* approaches, in its hygrometric condition, and in its action on the animal economy, our own winter season; the dryness of the former being produced by its distance from saturation; while, in the latter, it is determined by the lowness of temperature; the hygrometric state of the air being changed upon coming in contact with the body. As regards temperature, the result is quite the reverse."—Pp. 160–163.

The general result of the whole inquiry may be stated in the following manner.

Many persons have looked upon Madeira as a place pre-eminently well suited for the pulmonary, the bronchitic, and the phthisical invalid. Looking chiefly to the agreeable warmth, the luxuriant vegetation, the picturesque tropical appearance, and probably the insular situation of the island, they have regarded it as providing all those conditions of mild climate and steady temperature which physicians have required as necessary for the alleviation of the symptoms, and the final cure of the disorders of the phthisical. Thus, Dr Gourlay, though by no means a keen or exclusive advocate for the beneficial and sanative effects of the climate of Madeira, represents it nevertheless to exert great influence over the symptoms of the disease, and in circumstances in which the texture of the lungs is not extensively and irreparably destroyed, as capable of effecting a cure. He was much in the habit of giving foxglove in the treatment of consumptive cases; and he states that he derived from its use, both in natives and in visitors from England, the most beneficial results. In this he was not peculiar; for at that time, namely, between 1787 and 1808, many believed that foxglove was a genuine remedy in the cure of consumption, and all physicians almost prescribed it in pulmonary disorders. "I have," he says, "the greatest satisfaction in stating, that in almost every instance where I have administered this medicine in Madeira, I have experienced from it the most beneficial effects. In incipient cases of the disease, which generally occur only in my practice among the natives, I have very frequently obtained, by means of it, a perfect cure. Even in the advanced stages of the malady, where there prevailed not only purulent expectoration, but strong hectic fever, the usual state in which patients arrive from England, I have had great reason to be satisfied with its palliative powers, and a few of those instances I have certainly cured by it. One constant effect of it has been to delay for a time the fatal issue of the malady. Where the remedy, therefore, has proved unsuccessful, I attribute the failure more to the disease being allowed, from neglect and inattention, to proceed to that confirmed height, where neither medicine nor climate could be of service, than to any inadequacy of its specific influence. This unusual success I ascribe, in a great measure, to the concomitant advantage in the benignity of the climate, and a constant attention on my part to palliate the uneasy symptoms."*

More decided still, and abated by fewer conditions and exceptions, is the language of Dr Pitta.

"To phthisical patients, Madeira is peculiarly adapted, more especially as it is defended from those northern blasts which visit every part of Europe, and even the Mediterranean islands, during the winter; and which, though not frequent, are, when they do happen, sufficient to destroy all the advantages that a residence of several months had procured. Indeed, in all cases of scrofulous consumption, in which the patient does not idly delay, after being advised to leave England, physicians can with certainty promise him a cure.

"In all such cases of consumption not too far advanced, the climate of Madeira does prove a certain remedy. The causes assigned for this constant success are; first, the equal temperature of the climate; secondly, that the lungs are not irritated by any particles arising from an open fire, or by the contraction of the skin from a partial access of air, produced by artificial heat; and thirdly, that the roads being paved, and no wheel carriages used in the most inhabited part of the island, those clouds of dust never arise, which dry weather produces in other parts of the world, and which are always found injurious to weak or diseased lungs. But if Madeira be not repaired to in the earlier stages of the disease, it will be repaired to in vain. In the last stage, neither physical circumstances nor human skill can avail.

"Let no one, then, be misled by the absurd and dangerous statement of some,† that because the early stage of consumption is of an inflammatory nature, therefore the climate of Madeira (warmer, doubtless, than that of Britain) is not to be had recourse to in the early stages. Such persons are ignorant that

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* Observations on the Natural History, Climate, and Diseases of Madeira. By William Gourlay, M.D. London, 1811. Pp. 95 and 96.

† See a Treatise on Consumption, by a Dr Sanders.

Madeira is visited not on account of the degree, but on account of the equability of its temperature. It is indeed the winter of Madeira from November to June, as it is the summer of the South of England, that is best adapted to all stages of consumption."*

Notwithstanding these strong declarations, it was found that consumptive patients died in Madeira very much as they died in other parts of the globe. This mortality, which was very considerable, our excellent and lamented correspondent, Dr Renton, ascribed chiefly to the circumstance, that the patients were sent to Madeira too late, and with the disease in a stage too advanced. Little doubt can be entertained that to this cause a considerable proportion of the mortality might justly be ascribed. We know, nevertheless, that, subsequent to the warning voice raised by Dr Renton, cases have been sent thither by physicians who believed that they were not too far advanced, and that, notwithstanding, these cases have terminated exactly in the same way in which phthisical cases generally terminate. Nor is it possible to doubt that, whether from the inattention, or the carelessness, or the want of discrimination of physicians, or the anxiety of patients and their friends, Madeira continues to the present time to be the resort of many persons, who ought to have been allowed either to die or to recover at home. All this is the consequence of the erroneous ideas entertained and propagated on the climate of this island. It may be safely asserted from the testimony of the present author, as well as from other sources, that Madeira promises, as a residence for phthisical patients, no advantages which may not be obtained by places much nearer home, or even by home itself; while a visit to it, and residence in it are attended by many great evils which might be avoided. The delusion is kept up by statements published, from time to time, of the beauty of the island, the fineness of the climate, and its alleged immunity from the evils of other engy-tropical situations. Even so late as November 1834, there appeared in London an anonymous publication, in which, among other recommendations, the following description occupies a prominent position.

"The beautiful and fertile island of Madeira enjoys a situation perhaps the most desirable in the whole globe, which enables it to combine all the luxuries of climate with the comforts of civilization. There is a peculiar clearness in the atmosphere, with a transparency which seems to bring out fresh hues from every object, and the sky of a deep and stainless blue, is unsullied by a cloud. The air is soft and delicious, and strikes with a peculiar charm the stranger, whom perhaps a few days have transferred from the gloom and chill of an English winter. The island is also singularly free from the annoyances and inconveniences so common in warm climates, being subject to no epidemic fevers, and free from snakes or venomous reptiles of any kind."

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* Account of the Island of Madeira. By N. C. Pitta. M.D. &c. London 1812. Pp. 124-126.

This description is altogether poetical, and is little more than an assemblage of words conveying agreeable ideas and pleasing sensations. The secret of the effect of such descriptions is in some degree explained by a similar piece of fine writing from the late Captain Marryat. "I do not know," says that agreeable story-teller, "a spot on the globe which so much astonishes and delights upon first arrival as the island of Madeira. The voyager embarks, and is in all probability confined to his cabin, suffering under the dreadful prostration of sea-sickness. Perhaps he has left England in the gloomy close of the autumn, or the frigid concentration of an English winter. In a week he again views that *terra firma* which he had quitted with regret, and which in his sufferings he would have given half that he possessed to regain. When he lands upon the island, what a change! Winter has become summer; the naked trees which he left are exchanged for the most luxuriant and varied foliage; snow and frost for warmth and splendour; the scenery of the temperate zone for the profusion and magnificence of the tropics; a bright blue sky; a glowing sun; hills covered with vines; a deep blue sea; a picturesque and novel costume,—all meet and delight the eye, just at the precise moment when to have been landed even on a barren island would have been considered a luxury."

The whole of this description is a sort of mythical romance, which exists chiefly in the imagination of the writer. But independent of this, both writers have mistaken external aspects of the natural world and physical phenomena, for correct and accurate descriptions of climate. There are at least from forty to sixty places on the habitable globe, all nearly as accessible from England as Madeira, and the whole of them presenting quite the same appearances of tropical and engytropical regions. These are, the whole of the Canary Islands, the Azores, the Cape Verd Islands, the south of Spain, and Italy; and to these may be added, since the French steamers sail so regularly between Marseilles and Algiers, the northern coast of Africa. In all these spots the same blue sky,—certainly not always in Madeira,—the same blue deep sea, the same atmospheric temperature, the same appearances of the vegetable world, may await the voyager. But he must not imagine that, because he is on the verge of the tropics, the laws of the physical world are to be suspended, and the usual characters of the seasons are to be effaced. He must remember also, that the same humidity of atmosphere prevails at ordinary periods, and is liable to be attended with exactly the same physical effects, at night and before sunrise. If the temperature of the day be warm, and sometimes what may be termed glowing, that of the night and early morning is cold, chilling, and not unfrequently freezing. In short, between a tropical or engytropical latitude, luxuriant vegetation, picturesque beauty, and high atmospheric temperature, on the one hand, and salubrity to the human frame on the other, there is often no necessary connection. Often it is the reverse.

The main question, however, to be answered on the present occasion is, whether the climate of Madeira is suitable to phthisical invalids? So far as we understand the inferences drawn by the present author, and the bearing of the facts collected by him, it is not only not suitable for a large proportion of pulmonary and phthisical invalids, but it is in a remarkable degree unsuitable. This point, however, it is necessary to bring to more precise and practical conditions.

All testimony for the last twenty-five years goes to prove, that when phthisis has commenced and is established, that is, when several tubercular masses are broken or breaking down, and are either undergoing conversion into *vomicæ*, or are already converted into *vomicæ*, removal to and residence in a place like Madeira, is hurtful. The high temperature and the constant humidity, or some other cause, accelerate the progress of the disease; and the patient is rapidly enfeebled and brought to the tomb.

In earlier stages of the disease, that is, before the tubercular masses have become softened, and while the patient is labouring under the cough, bronchial catarrh, and feverish attacks which usually precede the active outbreak of the disease, the climate of Madeira is often observed to aggravate several of the feverish symptoms, unless measures be previously adopted, by means of medical and dietetic treatment, to abate those symptoms of local irritation and general fever. After this object has been accomplished, and active symptoms have been reduced to a state of quiescence, the climate of Madeira may probably be beneficial; and a residence there during the English winter promises a reasonable hope of adding some years to the life of a phthisical person, and, it may be, in certain cases, of extinguishing the disease entirely.

At the same time it should be distinctly understood, that very few cases of genuine tubercular consumption recover in Madeira; and where recoveries or notable ameliorations take place, in pulmonary diseases, the disease is not genuine tubercular consumption, but one or other of those disorders which assume its characters, in some instances so exactly, that even good observers may be deceived. The cases most likely to derive benefit from a residence in Madeira are instances of chronic catarrh, of chronic bronchial disease in general without tubercles, intercurrent attacks of chronic pneumonia, instances of chronic pleurisy, with or without empyema, chronic laryngitis without ulceration, instances of pulmonary congestion, connected with plethora and disorder of the digestive organs, and some of those obscure affections of the pulmonary membrane and circulation to which the name of asthma has been given. All the alleged recoveries of tubercular phthisis depend on errors in diagnosis; errors greatly more frequent than is generally known.

We have seen that Dr Mason himself found that the climate of Madeira was not suited to his own case; and that he found it necessary, after a residence of twenty-two months, to quit Madeira and remove to Nice. When the body was inspected after death, it is stated that the lungs were found seriously diseased; yet the state of these organs did not preclude the probability that life might have been prolonged for four or five years.

The most extraordinary part of the whole of this delusion as to the sanative influence of the climate of Madeira is, that consumption and scrofula are frequent among the natives. Dr Gourlay states that not only is phthisis common,* but marasmus and *tabes mesenterica* are frequent diseases.† Dr Mason adds that his own experience leads him to corroborate this inference of Dr Gourlay, and to add, that affections of the stomach and digestive organs are very general, being the principal cause of mortality among the majority of the inhabitants. (P. 108.) The impression of this insalubrity was so strong on his mind, that he informs us, that were the subject thoroughly investigated in the manner in which it ought to be investigated, few places would be found, where the system is more liable to general disorder; while, at the same time, he is of opinion, that the average duration of life would turn out to be inferior to that of our own country.

Some observations are made on St Michael's, one of the Azores, as a residence for consumptive invalids. We have often heard the Azores strongly recommended either by physicians from Madeira, or others who knew these islands more or less perfectly. From the observations of Dr Mason, however, it appears, that upon this subject as many and as strong delusions are prevalent, as upon that of the more frequented island of Madeira.

The main evil of the climate, according to Dr Mason,—and the remark must be extended both to the Canary and the Azore islands,—is the great habitual humidity of the atmosphere. This, according to his meteorological observations, renders the climate uncertain, and, according to his physiological views, hurtful to the pulmonary invalid. We do not feel it becoming to give any decided opinion which might oppose that of one who has made the climate of Madeira the subject of careful study; but we may be permitted to say, that humidity of atmosphere, if moderate, is not generally regarded as hurtful to pulmonary invalids. A moderately moist atmosphere is believed to be less irritating to many of those persons than a dry atmosphere. At the same time, we think that all hypothetical and speculative reasonings on this subject are liable to lead into error; and that the point can be determined in no other mode than by actual trial. A moderately dry climate is always more uniform and steady than a very humid climate, that is, it is subject to fewer and less sudden variations. On the other hand, in a moderately dry climate, the winter cold and the summer heat are always more considerable, and more intense. The only satisfactory mode of ascertaining the comparative influence of different climates on phthisical patients must be to study attentively the effects of residence in dry situations, and residence in humid situations, upon considerable numbers of persons, not only in health, but with various forms of pulmonary disorder. This has never been done, and, until it is done, it is vain to expect information on which much reliance can be placed. All must be conjectural and approximative.

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* "It is not to be concealed, that no malady is more prevalent here than phthisis with the natives of the island. Persons of all ages and of both sexes fall victims to it; nay, whole families have at times been suddenly swept away by it." —Observations, &c., p. 91.

† "In all dissections of this species of the disorder (*tabes mesenterica*), I have uniformly found the lungs full of tubercles, some of them in an indolent state, and others of them arrived at suppuration; while the mesentery and lymphatic glands were always at the same time affected."—*Ibid.* p. 94.

To those who desire information on the climate of Madeira, and its fitness for alleviating or removing their complaints, the present work is most valuable. If the reader will study attentively the facts and reasonings of Dr Mason, he will be able to form for himself an opinion not far from being correct. The information here communicated will enable him, or his physician, to judge whether it be worth his while to encounter even the fatigue of an eight days' steam voyage for the advantages which he is likely to reap. Apart from the tables and calculations, the book contains much pleasant and amusing reading.

To the political economist, the sixteenth chapter, by Dr Peacock, is one of great interest; and it would be well if the Portuguese government would put into practice some of the suggestions and propositions of that intelligent gentleman, who points out with great clearness several of the social and political evils by which the people are oppressed, and also shows the appropriate remedies.

ART. II.—*The Microscopic Anatomy of the Human Body in Health and Disease. Illustrated with numerous Drawings in Colour.* By ARTHUR HILL HASSALL, M. B., Author of a History of the British Freshwater Algæ, Fellow of the Linnæan Society; Member of the R. C. Surgeons of England; one of the Council of the London Botanical Society; Corresponding

Member of the Dublin Natural History Society. In two Volumes. London, 1846—1849. 8vo. Pp. 570. Sixty-nine Coloured Drawings.

The use of the microscope in elucidating the structure of the human body in the state of health, and the multiplied deviations to which that structure is liable in consequence of disease, has become so general, that it may be said to have opened up a new field, as it were, for study and investigation. Much new information on the minute normal structure of the most important tissues and organs has been collected; and if in various points this information presents discordant results, which are not easily reconciled, still so much light has been thrown upon various structures which were before imperfectly understood, that it is reasonable to think that some of these matters, which are at present involved in difficulty and obscurity, may be finally made more intelligible.

To trace the relation between healthy and morbid structure has at all times been a primary object with intelligent observers. The application of the microscope to investigate the effects of disease, was in some instances coetaneous with, and in others followed closely on, its employment in explaining healthy structures; and many inquirers, both in this country and in France and Germany, have contributed effectually, by these researches, to the formation of more correct views on the nature of various morbid processes and changes than it had been previously possible to acquire.

Of the most important and interesting of these additions to our knowledge, accounts more or less ample and more or less minute have at different times, as occasion required, been given in the volumes of this Journal; and not a few valuable communications on various points of microscopical anatomy, healthy and morbid, have also been, through the same medium, placed before the profession. In this country, indeed, the results of microscopical research have hitherto appeared principally in the form of detached essays, and monographs on particular subjects; and no general or comprehensive system has been attempted, until it was undertaken by the present author. On the continent, Henle, Donné, and Mandl, have undertaken to elucidate normal anatomy and physiology; and Canstatt, Vogel, and Gluge have undertaken the same duty for the textures altered under the influence and operation of disease.

Impressed with the conviction of the necessity of the student forming correct ideas on the nature of the healthy tissues, and comparing with these the alterations taking place in various forms of disease, Dr Hassall has undertaken to elucidate the whole subject in one work. The duty is not free from difficulty; and besides, that it is one of immense labour, it requires a rare combination of skill and dexterity, as well as knowledge and information, sagacity and judgment. Such a duty, in order to be performed well, requires to be performed, not merely by one who is himself an able microscopical observer, but who is well acquainted with the labours of his contemporaries; who is capable of justly estimating their merits, of supplying their deficiencies, and, if need be, of rectifying their errors.

This duty it affords us sincere pleasure in saying that Dr Hassall has performed with great ability. Extensive and complicated as the subject is, he has shown that he has spared no pains in obtaining accurate information, and that he has been truly actuated by the desire, to place before the student materials on the value of which he may rely in the prosecution of his microscopical inquiries.

The work consists of two parts; the first devoted to the Microscopical Examination and History of the Fluids of the Human Body; and the second to the Microscopical Anatomy of the Solids.

The whole treatise is subdivided into twenty-two Articles or chapters; and of these, seven are devoted to the history of the Fluids, and fifteen to the examination of the Solid Textures. The order adopted is very simple, and may be understood from the following short summary.

In the first article, the Lymph and Chyle, and the vessels containing them, are described; and, after an account of the ordinary physical characters, there is given a description of the granular bodies, the oil-globules found in these fluids, and the corpuscles of the thymus gland.

In the second article, which is the microscopical history of the Blood, Mr Hassall gives an elaborate and correct account of the constitution of that fluid, both during health and under the presence of disease; and introduces, with much ability, the facts ascertained by Dr William Addison, Dr Barry, Mr Gulliver, Mr Wharton Jones, Nasse, Donné, and Mandl. He then explains the phenomena of the capillary circulation, of the circulation of the chick in embryo, those of the dissolution of the blood-corpuscles, and the differences between arterial and venous blood. A large portion of the concluding division of the article is then devoted to the state of the blood in various diseases; inflammation, plethora, anæmia; the deficiency of fibrin in febrile disorders, and its increase in various inflammatory affections; its condition in hemorrhages; and the diminution of the albumen in various wasting diseases; with some instructive observations on the importance of microscopical examination of the blood in medico-legal inquiries.

This article is one which gives an instructive view of the subject, and cannot fail to be studied with interest and advantage.

The following passages contain the views of Dr Hassall on the End or Final Condition, that is, the purpose of the Red Globules;

a subject which has been already brought under the notice of the readers of this Journal when speaking of the observations of Mr Wharton Jones.

"Everywhere throughout the solid constituents of the animal organisation cellular tissue abounds; it forms the basis of every texture and organ of the body. It is, therefore, scarcely to be wondered at that the opinion should have been adopted, that the globules which exist in such vast numbers in the blood, were to be regarded as the primary and even parent cells, out of which all the solid structures of our frame took their origin. This theory, to the mind of the earlier micrographer, must have appeared very rational and seductive; and so great, indeed, is the plausibility with which, even in the present day, it is frequently invested, that it is still able to claim a few adherents.

"If we regard with the utmost patience and attention the beautiful spectacle of the capillary circulation in any of the more transparent parts of animals, but especially in the tongue of the frog, we shall in vain look for the escape from their containing vessels of even a single red blood-corpuscle, independent of a rupture of those vessels. In a normal state, therefore, the blood-globules are never free, but are always enclosed in their own proper receptacles.

"A communication, however, between the fluid contents of the blood-vessels and the tissues lying external and adjacent to them, is doubtless established, through the operation of the principle of exosmosis, whereby a slow exudation of the fluid fibrin of the blood is perpetually going forward. Now it is the opinion of most of the German physiologists, and it is the view best supported by facts, that this fluid fibrin is to be regarded as the true *blastema*, out of which all the different elementary tissues and structures of the body proceed; and this not by any power inherent in itself, it being, as respects the final form which it is made to assume, totally inert and indifferent, and which form is impressed upon it by a *vis insita*, or peculiar power and faculty belonging to each organ and structure of the animal fabric.

"While the fibrin circulates in the blood it retains its fluid form; soon after the cessation of the circulation, and whether within or without the system, it passes from the fluid state to the condition of a solid; now, on the principle of endosmosis, which has to be so often referred to in the explanation of numerous phenomena, in the solidifying power of the fibrin, and in the *vis insita* of the different tissues, we recognise the chief and fundamental causes which regulate nutrition, growth, and secretion.

"It would thus appear that the globules of the blood (the red globules are more particularly alluded to) are not to be regarded as either cytoblasts or primary cells, forming by direct apposition the solids of the body; and that, therefore, they do not express the last degree of elaboration of which the fibrin of the blood is susceptible.

"Again, then, we have to ask ourselves the question, what is the end, or final condition, of the red blood-globules? Direct observation is wanting to aid us in the solution of this difficult inquiry, which, however, admits of an indirect reply being given:—we have seen that no means of egress from the blood-vessels is, under ordinary circumstances, permitted to the red blood-globules, and, therefore, we are driven to the conclusion, that, having performed the important function to which we have already alluded,—viz., that of carriers of oxygen from the lungs throughout the system, and of carbon from the latter back again to the lungs,—they become dissolved, increasing by their dissolution the amount of fluid fibrin circulating in the blood, and which is deemed to be the true *blastema.*"—Pp. 62–64.

Article third is devoted to the subject of Mucus; and article fourth to that of Purulent Matter. The author gives a correct account of the formation of the purulent corpuscula, and the distinctions, founded on these bodies, between purulent matter and mucus. Then follow observations on the detection of purulent matter in the blood; on false or spurious purulent matter, especially softened fibrin; on metastatic abscesses; and, lastly, on venereal vibrios, or the minute parasites found in the matter of syphilitic chancres.

Article fifth is devoted to the microscopical and physiological history of Milk. It is well known that upon the exact nature of the globules of this fluid considerable differences of opinion are entertained by different observers. The author examines attentively the different representations made by Turpin, Mandl, and Henle, who maintain that the globule is organised; and those of Wagner, Nasse, and Quevenne, who deny organisation. His own inferences from personal examination are contained in the following passages.

"The truth in this instance, as in so many others, would appear to lie in the mean. That the milk-globule is not provided with a distinct and separate membrane, similar to that of the mucous corpuscle, is proved by the impossibility of demonstrating the existence of any such structure, as well as by the absence of a double line around its margin, the non-effect of iodine, and the coalition of the globules resulting from pressure, first observed by Dujardin.

"That it is not constituted of a single perfectly homogeneous substance is also demonstrated by the observations of Mandl and Henle, and especially by those of the latter observer on the effects produced by acetic acid.

"That the milk-globule is not wholly composed of fatty matter is shown by its insolubility in boiling water raised to a very high temperature, in boiling alcohol, in the alkalies, and by the effects of the application of acetic acid. Ether dissolves the milk-globules: their solution, however, it does not entirely accomplish on its first application, although the ether, the moment it comes in contact with the globules, causes them to lose their rotundity, to fall down, and to run together into masses of various sizes, but most of which still present a circular outline.

"If a drop of milk be examined microscopically, after its treatment by ether, a hasty observer might conclude, from noticing so many of the circular masses alluded to, that the re-agent had not exerted any influence on the milk-globules, and that these masses were the unaltered globules. This view, however, a little reflection would soon show to be incorrect; for many of the circular bodies now noticed on the field of the microscope are larger than even the largest milk globules, and all of them are flat and semi-fluid.

"The several facts now adduced, while they prove that the milk-globule is not organised in accordance with the interpretation of the word organisation usually given, yet seem sufficient to establish the fact that it is composed of two distinct organic products, the one internal and fatty, and the other external and possessed of properties distinct from fat.

"This explanation of the constitution of the milk-globule serves to explain also satisfactorily the facts above alluded to,—viz., the non-action of boiling water, alcohol, and alkalies, all of which affect, more or less, fat, as also the slower operation of the ether. It also shows why boiling alcohol should immediately dissolve the milk-globules, to which a little acetic acid had been previously added,—this latter re-agent first removing their outer coating, which is insoluble in alcohol.

"Between the globules of the previously-described fluids, those of the lymph and chyle, of the blood, mucus and pus, and the globules of milk, no structural or functional relation whatever exists; the former being complex and definite organisations or cells, and the latter constituted of two distinct substances indeed, yet want entirely the attributes of cells, being destitute of nucleus and cell-wall.

"It is of the globules just described that the cream is constituted, their accumulation on the surface of the milk being due to their lighter specific gravity; it is also by their incorporation with each other, and which is effected by the operation of churning, that butter is formed."—Pp. 159, 160.

Under the head of Pathological Alterations of the Milk, are given accounts of the continuance of the milk in the state of Colostrum, and the influence of prolonged retention of the milk upon its constitution. Different from the effects upon other secreted liquids, milk, when too long retained in the breast, becomes thin, watery, of lower density, and less nutritious, than that which is retained for a short period.

The author afterwards considers the character of good milk, and offers some useful observations on the adulterations to which that liquid is subjected. The whole article contains much precise information.

Article sixth is on the seminal secreted product.

Article seventh is on the Saliva, Bile, Sweat, and Urine, which are classed together as unorganised fluids.

This constitutes the first division of the treatise, occupying two hundred and twenty pages.

The second part,—devoted to the microscopical anatomy of the Solids, or the Organized Tissues. The author commences with an account of the Fat in article eighth.

Then follows in article ninth the Epithelium and its leading forms, Tesselated Epithelium and Cylindrical Epithelium, with accounts of the modifications which are presented in different organs and regions. Next, in article tenth, comes the Epidermis; in article eleventh, the Nails; in article twelfth, the Pigment Cells; and in article thirteenth, the Hair.

The first of another series of textures is considered in article fourteenth, in which the author examines the minute structure of the True cartilages, and the Fibro-Cartilages, and explains the nutrition of this substance.

In the fifteenth article follows Bone, with periosteum and marrow, and the Medullary membrane; and in the sixteenth, the Teeth.

The seventeenth article is devoted to the microscopical history of Cellular, or, as it has been recently called by various foreign anatomists, Fibrous Tissue; a name which is a little objectionable, in so far as it is liable to be confounded with the Proper Fibrous Tissues, or what may be named the Fibro-Gelatinous Tissues.

The eighteenth article contains an ample, and, on the whole, instructive account of the several forms of Muscular Tissue; and in the nineteenth article is given a short account of the minute structure of the Nervous and Cerebral matter, according to the most recent authorities. Under this head we observe an instructive account of the Pacinian Bodies, illustrated by very excellent figures.

In the twentieth article, which is devoted to the organs of respiration, Dr Hassall gives a short sketch of the minute structure of the Lungs, the bronchial tubes, and the air cells; and then a view of the changes most commonly observed in different diseases.

The twenty-first article is devoted to the anatomical history of the different orders of Glands. These are arranged in the following order: *a*, Unilocular Glands; as Follicles or Crypts;

Stomach tubes; and the Intestinal Follicles, simple and compound. *b*, Multilocular Glands; as the Sebaceous Glands; and the follicles of the Mucous Membranes. *c*, Lobular Glands; as the Salivary and Lacrymal Glands, the Mamma; the Liver; the Prostate Gland; Cowper's Glands. *d*, Tubular Glands; as Brunner's Glands, the Kidneys, the Testes. *e*, Ganglionary Glands; among which are placed the Brain and Cerebellum; the Medulla Oblongata and Spinal Chord; and the various Ganglia. *f*, The Absorbent Glands. *g*, The Vascular Glands, including the Spleen, the Supra-renal Capsules, the Thymus, the Thyroid Body, the Pituitary Body, the Pineal Gland. And, lastly, *h*, Germ-bearing Glands, by which are understood the Ovaries.

This article, which embraces, it will be seen, a great variety of objects, is necessarily complicated and a little lengthened. The minute structure of the Liver, the Kidneys, and other complicated Glands, is explained with much ability, and rendered as clear and intelligible as such a subject can be.

The twenty-second article, which is also the last, contains the microscopical anatomy of the organs of the senses, in the following order:—1st, The skin and its papillæ, as organs of touch; 2d, The structure of the mucous membrane of the tongue, and its several orders of papillæ, as the organ of taste; 3d, The structure of the mucous membrane of the nose, as the organ of smell; 4th, The several constituent textures of the eye, and its appendages; and, 5th, The minute structure of the several divisions of the ear, external, middle, and internal.

In an appendix are given accounts of the minute structure of the Pituitary Gland, the Pineal Gland, the Pia Mater, the Pacchionian Glands, the development of the Adipose Vesicles, Mr Rainey's observations on the structure and formation of the Nails, Mr Rainey's view of the Ganglionic character of the Arachnoid Membrane, some remarks on the Synovial Fringes, and Mr Rainey's account of the minute anatomy of the Sudoriforous Organs.

Upon all these subjects, Dr Hassall has been at much pains to place before the reader information of the highest authority, and possessing the strongest claims for accuracy.

We have never attempted to conceal the fact, that microscopical anatomy is altogether in a state of progressive transition from much uncertainty, and not a little confusion and disorder. Many alleged facts have been collected; but of these not a few are questionable and at variance with each other, and have been in different modes questioned. Several new representations of the minute anatomy of very important organs have been brought forward by different individuals. But all of these are, more or less, discordant with each other. Scarcely one of the microscopical anatomists who have given accounts of the lungs, the liver, and the kidneys, agrees with another. In the representations of the muscular texture, and of many of the glands, it is utterly impossible, at present, to reconcile the statements and descriptions of different inquirers. Nor is it otherwise with the blood, and several of the secreted fluids.

These facts are so undeniable, that it is much more easy to indicate discordant points, and statements not always intelligible, than to construct from the whole a consistent and useful description. The great evil of all this is, that it tends to disconcert and discourage the student, and make him think that it is impossible to arrive at the truth. It requires little penetration to perceive, that the effectual remedy for all this uncertainty is to be supplied by time; and that a still greater number of facts and observations requires to be obtained, in order to be employed in rectifying and modifying those which are already regarded as constituting part of the science. It will, in this manner, be ascertained what are truly facts, what are entitled to that character, and what are merely the representations of fancy.

It is evident that much yet requires to be done before the science of microscopical anatomy can be regarded as in a state approaching even to be settled. Probably it is impossible for it ever to be in such a state; and, under the most favourable circumstances, it can only be through many errors and fallacies, many corrections and renewed observations, that even a considerable amount of accuracy and truth can be obtained.

A very direct step to this consummation is effected by the work of Dr Hassall, who has laboured meritoriously in endeavouring to bring order out of confusion, certainty out of numberless uncertainties and fallacies, and uniformity out of multiplied discordance. This work will be useful not only to the student, but to the advanced microscopical observer, in showing him the boundaries between fancy and fact,—between what is ascertained and what is only supposed; and will teach him, consequently, how to direct and regulate his own inquiries. The work may be justly recommended as one of great utility to all who wish to obtain just notions on the present state of microscopical anatomy.

Art. III.—1. *On Healthy and Diseased Structure, and the true Principles of Treatment for the Cure of Disease, especially Consumption and Scrofula; Founded on Microscopical Analysis.* By William Addison, M.D., F.R.S., Licentiate of the Royal College of Physicians. London, 1849. 8vo. Pp. 320.

2. *Thoughts on Pulmonary Consumption; with an Appendix on the Climate of Torquay.* By WILLIAM HERRIES MADDEN, M.D., Physician to the Torbay Infirmary and Dispensary, &c. London, 1849. Post 8vo. Pp. 219.
3. *A Few Suggestions on Consumption.* By ROBERT HULL, M.D., Extra-Licentiate of the Royal College of Physicians; Physician to the Norfolk and Norwich Hospital. London, 1849. 12mo. Pp. 138.
4. *Clinical Lectures on the Diagnosis of Phthisis. Delivered at the Hospital for Consumption and Diseases of the Chest.* By RICHARD PAYNE COTTON, M.D., Member of the Royal College of Physicians, London; Assistant-Physician to the Hospital. (From the London Medical Gazette). London, 1849. 8vo. Pp. 23.
5. *The First Medical Report of the Hospital for Consumption and Diseases of the Chest. Presented to the Committee of Management by the Physicians of the Institution.* London, 1849. 8vo. Pp. 42.
6. *An Inquiry, How far Consumption is Curable; with Observations on the Treatment, and on the use of Cod Liver Oil and other Remedies; with Cases.* By JAMES TURNBULL, M.D., Physician to the Liverpool Infirmary; formerly Physician to the Northern Hospital, and Lecturer on Clinical Medicine at the Infirmary. Second Edition, enlarged. London, 1850. 8vo. Pp. 106.

AMONG physicians, at present, two opinions are entertained regarding the sanability of Tubercular Consumption. One party maintains that when once established the disease uniformly proceeds, unless in a few exceptional cases, in a definite time of no long duration, to the fatal event. Another party maintains that the disease undergoes spontaneous cure; and, therefore, that it may be cured under the observance of certain therapeutic measures; and that it is cured.

It is impossible to conceal the fact, that among the latter party may be enumerated a considerable number of physicians, who appear to be quite conscientious in the belief which they entertain, and, in other respects, persons of good intelligence and fair attainments in medical knowledge. It is equally impossible to deny that there are others who would fall under a denomination which it is unnecessary to specify.

The question comes to be, can both parties be in the right?

and how can opinions so opposite be so confidently maintained by persons trained to study the same facts, accustomed to observe the same disease, and having occasion to treat patients labouring under the same form of disease, and beholding, it may be, the same ravages in the organs after death?

It is quite unnecessary to consider here the arguments by which the advocates for the sanability of consumption maintain their statements. This has been several times done in the pages of this Journal, and their facts and arguments were considered at sufficient length in Volume Sixty-fourth, when we had occasion to consider the method of treatment by naphtha.* In one sense, it must be admitted as a fact, proposed and said by these gentlemen to be established, that tubercular phthisis is curable, and has been repeatedly cured. It seems to be of no avail that it is daily pointed out, that phthisical patients die at present exactly as they died twenty years ago, and that the annual mortality from consumption is still about 60,000 persons. What these gentlemen maintain is, that consumption is quite a curable disease, and is often cured. Neither is it of avail to show, that the cases of alleged cure or recovery from consumption were not instances of tubercular phthisis, but only of some other disease which closely resembled that malady. The answer is, that, with the present means of diagnosis, such mistakes are impossible, and that, undoubtedly, the patients to whose cases they refer, were labouring under phthisis, and did entirely get the better of the disease.

It is unquestionably a much more cheerful doctrine to maintain, on good grounds, that a disease which is generally believed to be incurable, is susceptible of cure, than that it is not. The physician makes more efforts to control and alleviate symptoms, and ameliorate the condition of his patient, than if he believed that all endeavours are unavailing. As to the patient, it is difficult to say how such belief acts on him or her; for it is a peculiar feature of consumptive patients, that they hope and believe to the last, that they are getting better; so that greater confidence could not be inspired by saying that the disease may subside and get well, than if the patient were to be informed that the termination must be fatal.

There is one point which gives all a fair and reasonable ground for pronouncing what is denominated a favourable prognosis. It is allowed by all physicians, that incipient phthisis is a much more curable disorder than the confirmed form of the disease; and as the boundaries between the incipient and confirmed stage of the disease are, in the minds of many physicians, not very distinctly defined; and as, above all, the diagnosis of incipient phthisis is by no means in all cases an easy matter,—it may be always allowed to give a favourable view of the case, when it presents those characters by which it is to be referred to the head of the incipient disease.

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* Edinburgh Med. and Surg. Journal, Vol. lxiv., p. 459. 1845.

The works which have been published within the last twelve months upon consumption, may all be said to symbolize the principle, that consumption is curable. Some of them may be said to regard it as perfectly curable; some as more curable than formerly. In all, the theoretical views are enunciated, and the therapeutic directions are delivered, on the understanding that the physician is to be successful, that the disease is to be cured, and that the patient is not to die but to live.

The operation of the principle is also clearly seen, and directly applied to practical purposes, in the establishment of an hospital for the treatment of consumption and other diseases of the chest. This hospital was first established in 1842, at Chelsea, upon a small scale. Part of a large building planned for the accommodation of sufferers under these diseases is now erected at Brompton; and the first Report of the labours of the medical attendants is now before the profession.

To refrain from wishing well to all such endeavours is impossible; and were it possible, it would not be right. It is often a useful principle to regard as curable a disease which experience may have hitherto shown to be incurable, provided due judgment be exercised in not doing what is known to be hurtful. Then it is not to be forgotten, that the first origins of pulmonary symptoms are in many instances so completely dependent on some neglect or violation of hygienic rules, that it is quite impossible to say how much good may be effected, and how much evil may be averted, by directing the attention forcibly to the first approaches of disease. If it were possible to instruct the public in what might be denominated MEDICINA PHTHASTICA, or Prophylactic Medicine, and to make them act on the instructions, it is impossible to doubt that much sickness and mortality might be prevented, and that, among others, many instances of incipient consumption might be arrested in the early stage, before irreparable injury was done to the lungs. In how many instances what are called neglected colds, that is, catarrhal attacks overlooked, have gone on without let or hindrance until the symptoms of tubercular phthisis were fully and unequivocally established?

The work of Dr William Addison is the most ample, and, on the whole, the most philosophical and learned of all the writings which have lately appeared on the subject.

It is moderate in language and pretensions, sincere, not extravagant, and gives views of the subject of that rational and sober description that renders it in all respects entitled to attention. Dr William Addison is well known as a diligent and accurate microscopical observer, and as one who has studied, among other things, the minute anatomical structure of the lungs with great attention. His researches with the microscope, both on the healthy tissues and on those affected by scrofulous deposition, he employs in order to elucidate the nature of pulmonary consumption, its alleged sanability in certain circumstances, and the mechanism by which cure is accomplished.

His present work is one in all respects of much interest and great value. After an Introduction on the General Nature of Cells and the characters of organisation in general, he enters in Part First on PRACTICAL PHYSIOLOGY, and gives of that subject a very interesting sketch in chapter first. Then follows, in chapter second, PRACTICAL PATHOLOGY, in which are given a view of the scrofulous diathesis, the pathological anatomy of tubercular consumption, inflammation, and its phenomena and effects.

Next follows, in chapter third, PRACTICAL PSYCHOLOGY, presenting, in two sections, a correct and philosophical view of the influence and operation of causes on disease, and especially conditions of the moral constitution of the frame, and a comparative examination of the difference between morphological and neurological phenomena, or those which give rise to, and are connected with, organic changes in the textures, and those which depend merely on changes in Innervation.

Our limits do not allow us to enter into any examination of this first part of the work, which, nevertheless, we can, from perusal, strongly recommend, as presenting most instructive and interesting views on the etiology and distinctive characters of disease. Various cases, illustrating the doctrines of the author, are interspersed.

The Second Part of the work,—on the Symptoms, Causes, Therapeutics, and Cure of Consumption,—bears a more close and direct relation to our present subject.

Dr Addison is first desirous to convey correct ideas of what is understood by the words cure and recovery, in regard to pulmonary disorders. He thinks that numerous facts show, that, in the course of various diseases of childhood and youth, the lungs are liable to receive a morbid impression sufficiently strong to change, in a considerable degree, their normal structure. The patient does not die; he is said to recover, to be cured. But, answers Dr Addison, it is not to be expected that the perfectly sound state is restored.

From facts ascertained by various competent pathological observers, Dr Addison thinks we are entitled to infer, that the lungs may not only be the seat of anatomical changes, constituting a chief malady with urgent symptoms,—bronchitis, pneumonia, or pleurisy,—but that they may also suffer minor anatomical changes without symptoms, supervening upon some malady in another organ or system, or accompanying the prominent disease in the same organ. When, therefore, he continues, we discourse of infants recovering from teething, convulsions, pneumonia, or diarrhœa, or of youth recovering from measles, scarlet fever, or hydrocephalus, we must bear in mind, that the term recovery implies no more than the relief of the patient from the primary malady and its prominent and marked complications. Latent anatomical changes supervening without signs, may, he argues, with the recovery, return to their natural state, and the whole organism may regain its original vigour. It does not necessarily follow that they always do so. The cure of the principal disease does not necessarily imply the eradication of the secondary anatomical changes without symptoms; on the contrary, inspections show, in the particular case of tubercles in the lungs and other organs, that such is not the case.

> "There is, then, every reason short of actual demonstration, which in the living cannot be obtained, to conclude, in cases of slow and protracted recovery from the ordinary disorders of infancy, childhood, and youth, not only that secondary anatomical changes have supervened and persist, but that tubercles are probably one form of these changes. When, therefore, we speak of a disease being cured, or of a patient recovering, it is necessary to agree upon what is implied by the terms cure and recovery. They cannot mean that all the organs implicated in a disease—all the secondary anatomical changes—shall return to their natural state; for in the living body we may presume, but can never know, this really to be the case. The word cure must necessarily be limited to the subsidence of the known symptoms and sympathies of disease, without reference to the anatomical changes, which have no symptoms."
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> "The facts here briefly stated naturally give rise to the following considerations. That, as in the dead, a refined analysis of morbid anatomy proves that anatomical changes are seldom, if ever, confined to one organ at once; and as in the living a more accurate scrutiny of the phenomena of recoveries and cures warrants the same inference;—so the phenomena antecedent upon pulmonary consumption, render it at least probable that that malady is not primary, but one consequent upon anatomical changes of a secondary character, which precede the evolution of the symptoms. Should this be true, important consequences follow. For the previous history of the person, in respect of all former illnesses and cures, with reference to these changes, must become known, before the Etiology can be understood, and before a sound basis of therapeutics can be laid down for the recovery."—Pp. 194, 195.

Dr Addison is then led to consider minutely the Etiology of Consumption, as indicated by the natural and statistical history of the mortality of the human race.

From statistical returns he observes it results that there are two periods before the age of twenty-five remarkable for high mortality. The first of these is among children under three years, among whom the mortality amounts to 125 per thousand, or one-eighth. The second period is between fifteen and twenty, and onwards to twenty-five. Between fifteen and twenty the mortality rises from twenty-seven to thirty-five per thousand, and between twenty and twenty-five to forty-one in a thousand, or at the rate of thirty-eight per thousand for the whole period below twenty-five years.

From these statistical facts he infers, that the mortality of the infant and growing is comparatively greater than of the adults. There are therefore natural and unavoidable causes for the mortality at these periods of life; and if for the mortality, there must be the same for the illness followed by cures and recoveries.

Consumption is, according to Dr Addison, not a primary malady. The term tubercle is not well defined by any author. But even were it perfectly defined, it is not to the tubercular deposition that we are to look. The mere presence of tubercles is not consumption (p. 77). Anatomical changes themselves do not appear alone to be productive of the characteristic symptoms, which are more frequently, as we understand the author, dependent on the orgasm going on around these anatomical changes. Retrograde changes of the parenchyma take place as well around the condensed lobules of an Atelectasis or pneumonia, as around granulation-tubercles; that is to say, around the anatomical changes of a primary, as well as of the supervening malady. In consumption it is not the tubercles, the filled up air spaces and hardened lobules, which we regard, but the living respiratory texture contiguous; just as in a cavity of the lung, it is not the purulent or tuberculous matter within it to which our attention and efforts are directed, but to the enlarging circle of altering texture which forms its limits and boundary. The malady known by the term phthisis and tubercular consumption, therefore, is one not arising simply from hardened and useless portions of lung, of any particular kind or special origin, but proceeding from altered nutrition, or retrograde morphology, with excreting properties in the pulmonary tissues surrounding it; so that, whether from atelectasis at birth, pneumonia, or granulations supervening upon remote maladies, we arrive at the same end, a hardened or condensed portion of lung, a tubercle or tuberculated mass,—a permanent anatomical change. Yet all this may be, Dr Addison thinks, without active symptoms, at least where there is in the altered parts no nutritive activity. It is what he calls the retrograde morphology with properties of growth, which, being an active change, gives rise to an increasing amount of external signs. It may be added, that by retrograde morphology, the author means processes by which the tissues are disintegrated.

After pursuing the subject under the aspect of inflammation excited in good and in strumous habits, and considering the effects of wounds and injuries, and the introduction of foreign bodies into the lungs, Dr Addison thinks that two considerations may be regarded as reasonable. First, there is no difficulty in comprehending the relation between anatomical states and events; nor should it excite surprise that large tubercles or small cavities in the lungs are sometimes to be ranged in the category of states. Dr Addison is of opinion that tubercles of themselves, nay, even small vomicæ, produce little effect as characters of consumption. So long as the natural textures contiguous to them remain free from irritation and without change in nutrition, no prominent signs of illness will appear. In such circumstances he allows that tubercles are present, but not consumption. It is only, when some event supervening upon those anatomical states, some new cause or new irritation completes the required concurrence of conditions, and symptoms are evolved and become manifest, that the disease can be said to exist. In the second place, Dr Addison thinks that we need not hesitate to admit that consumptive cavities are sometimes cured in the same manner and by the same means that cure the cavity in which a foreign substance is enclosed in the lung, namely, by the villous secreting surfaces metamorphosing into non-secreting fibrous textures. In short, according to Dr Addison, the anatomical states in these circumstances remain. The external signs have been brought into a state of quiescence or inactivity.

"During the progress of our researches upon the origin and morbid anatomy of consumption, several times we have had proposed to us the question,—But can you cure the disease?" To this question Dr Addison returns the following answers:—

First, If we watch the progress, observe the times and study constitutional changes after the reputed cure, of all severe internal maladies, from birth to puberty, and realize the fact, that the preliminary state, disposing to consumption, may be founded in the cradle,—we may prevent it.

Secondly, In patients actually labouring under consumption in its early stage, if we study attentively his previous habits and life, and become well acquainted with his present state; if we discover whether removable irritating conditions be operating; and if we remove them, or prevent their operation,—we may stop the progress of the disease. The practicability and the realization of this result, nevertheless, is encumbered by a very considerable condition, which it may not be always possible to ensure. "Removable conditions being present, the cure may follow spontaneously upon their removal; but anatomical states only being present, the problem of cure is necessarily more difficult." It is indeed a most cruel and unfortunate difficulty, that in by far the largest proportion of cases of this class, anatomical states are present, that is, the lungs are extensively occupied by tubercles; five or six small vomicæ are already formed in the upper lobe of the lung; and considerable induration has taken place all over the parts; and even in the middle lobe, tubercles and tubercular masses may have been formed.

"*Lastly*, We may be asked what assistance we can afford to those deeply affected with consumption? If we expect to discover means whereby large tubercles may be removed, and caverns healed, so as to be replaced by pulmonary texture, we must be disappointed; for no such cures take place." This is candid, and shows that the author, however desirous to enforce the curability of consumption, yet has no intention of declaring that to be practicable, which nature has pronounced impracticable.

If, on the other hand, we confine our expectations within the limits of natural laws, we may hope to arrest the progress of retrograde metamorphosis, that is, disorganisation, by promoting the fibrous type in the secreting walls of cavities. When this can be accomplished by art, a state coming within the meaning of the term cure has been effected. Concretions, tubercles, puckered patches of the parenchyma, scars, fibrous bands and cartilaginous cicatrices may remain, may limit the function of respiration, and, as in the case of foreign bodies in the lung, may alter the constitution; but as the accumulation or production of cell organisms and the growth of granulation fabrics is abolished, unnatural secretions cease, life is prolonged, and some degree of health is restored. The author thinks, in reference to this point, that it is consolatory to know that when persons approach the age of forty years, the morphological activity of cell organisms is on the decline, at least as to retrogradation of the pulmonary parenchyma; so that a disposition to active changes in the texture surrounding old tubercles, or limiting secreting cavities, is also on the decline. Persons in this state may live as invalids indeed, with all the signs of cavities and tubercles to a limited extent.

A very considerable difficulty arises as to the condition above mentioned, to which the author applies the terms of "promoting the fibrous type." Is it in the power of man to promote this type in such circumstances; that is, to consolidate the secreting walls of cavities, to shrivel them, and cause them to cease to secrete muco-purulent matter, and to form new fibrous tissue? This the author afterwards (p. 312) virtually admits we are quite unable to do.

We must, however, merely give a sort of summary of the doctrines of Dr Addison in regard to the sanability of consumption, and the general means by which this object is to be fulfilled.

The terms consumption and tubercular phthisis not do embrace an exclusive or definite idea on which it is possible to found fixed therapeutical doctrines and methods of treatment for cure. Though all cases of consumption have certain common features, yet they differ greatly in details, and are as dissimilar as persons who differ from each other in stature, bulk, colour, expression, complexion, in strength, temperament, and constitution. Consumption is a scrofulous disease, and scrofulous diseases are retrograde growths, that is, disorganising processes; whether the new matter cohere to the pre-existing texture, as granulations, *villi*, or false membranes or fibrous textures; or be extruded and fall from it as purulent matter, or suppuration and ulceration of the mucous tissues. When, by means of remedial agents, we interfere and stop the growth, in one class of persons the inherent resources carry on and complete the cure. Such persons are said to possess a good constitution. There is another class of persons in whom the interference and means employed to arrest the morbid growth, are not sufficient for the purpose of cure. Such persons are said to be of scrofulous constitution.

In simple inflammation, when therapeutical measures for stopping its progress have been carried into effect, useless elements are absorbed and eliminated, conformable morphological operations follow, and the cure is completed, without complication in the disease, or further trouble to the patient or physician. But in consumption it is quite different. After whatever therapeutic measures have been adopted, it does not follow that tubercles disappear. They remain, and along with them other anatomical changes and lesions.

In all ordinary cases of consumption, nevertheless, it is requisite, as both states and events are present, that is, anatomical conditions and a certain state of the living functions, various by deviating from the normal standard; it is necessary to keep steadily in view both sources of remedial treatment,—namely, hygienic circumstances and medicine. Neither are good or sufficient alone. It is when taken in combination that beneficial impressions are made in any given case.

Lastly, consumption is a retrogradation, that is, a disintegrating process of the pulmonary parenchyma; and it involves phenomena of pneumonia, pleurisy, bronchitis, and ulcerative destruction. It derives a most prominent and specific character from the multiplied limited areas which it attacks, and the failure of absorption when the energy of growth has ceased. Its phases, symptoms, and progress, are influenced by idiosyncrasies of age, temperament, and constitution, and consequently evince great varieties in these respects. Its progress may be restrained and accelerated, and it may be cured by taking advantage of climate, air, and situation, by the use of appropriate medicine, and by due regulation of diet, and also by reciprocal actions between the blood and texture of other parts in the frame. But the great points upon which attention must be steadily concentrated are,—1st, the primary corpuscular and protoplastic growth,—namely, the granulations; 2d, the cessation or indolence of absorption when that growth has ceased, the circumstance which gives permanence to tubercles; and, 3d, the vascular transformations and renewed growth which, arising in the natural textures surrounding tubercles, constitutes confirmed consumption.

The Thoughts on Pulmonary Consumption, by Dr Madden, present a well-digested sketch of the disease, arranged in two parts. In the first, the author gives an instructive view of the chemical and histological history of tubercles, and the physiology of that formation. He examines the state of the blood in the phthisical; the state of nutrition; and concludes with some observations on the relationship and identity of tubercular and scrofulous diseases. Dr Madden concludes, from many facts, that we must, in the present state of pathological knowledge, regard scrofulous affections of external parts, and tubercular diseases of the lungs, as separate manifestations of one and the same constitutional taint, originating in the same defect of organic elements and vital energies, and to be guarded against and treated, when present, by the same therapeutic measures.

In part second, which is devoted to the history of the manifested and established disease, the author describes the forms and varieties of phthisis; the symptoms; considers the analogies with diseases arising from morbid poisons; examines the methods of diagnosis, and takes a view of the mode of treatment.

In this last division Dr Madden shows a very considerable amount of good sense and judgment. He does not regard the disease as in all instances and circumstances curable; neither does he look upon it as absolutely incurable. In the early stage he considers it as an affection most commonly of inflammatory character, and he lays down accordingly instructions for promptly and efficiently subduing inflammation. After this has been done, he trusts to regulated diet, attention to clothing, and to the management of the non-naturals, as they are termed by Dr Hull. In cases more advanced, and where there are not grounds for active measures, he treats each case according to its leading and urgent symptoms, and does not trust to any uniform method.

The treatise is altogether one which shows that the author does not deal in exclusive views, and thinks that the physician may still be useful without converting himself into a mere routine practitioner.

In a short appendix, the author gives a view of the properties of the climate of Torquay, which may enable physicians to judge of the sanative influence of that locality.

The Few Suggestions on Consumption, by Dr Robert Hull, form a singular production. With considerable observation and reflection, Dr Hull thinks for himself on all subjects, and on many differs from his predecessors and contemporaries. He is evidently a person of much experience; and from one part of his treatise we infer that, as student and practitioner, he has been engaged in the profession for forty years. (P. 40.) If there be any one whom he follows in the treatment of consumption, it is Sydenham. He is rather a confident opponent of depletion, revulsion, low diet, and similar remedies; and an advocate not less confident for the use of good and nutritious, if not full, diet, horse exercise, exposure to fresh air,—and, in one word, the whole of what may be called partly the tonic, partly the soothing, treatment of consumption. He is, consequently, rather opposed to doctoring and drugging in any and all forms; and more than once expresses the opinion that infinite mischief is done, both by practitioners and by others not in the profession, from too great confidence in the use of mere medicines.

Neither is he a disbeliever in pathological anatomy. But he reposes little confidence in its minute and refined distinctions. The theory, if theory it may be called, which is dispersed in fragments through one hundred and thirty-four pages, and comes before the reader only in the most desultory manner, is, that consumption depends upon weakness,—either contracted in infancy by bad nursing, or subsequently by neglect of hygienic rules, especially in boarding-schools and similar situations. (P. 26.) Thus he ascribes a large proportion of the consumptive diseases, by which young females are destroyed in this country, to scanty and improper food at boarding-schools when the frame is growing. "The British Islanders," he says, "should be allowed to eat animalized food, so far as they may covet and can concoct. Infants should be reared on milk; children on meat much more than at present; and youths and adults be taught, that if they devour the nitrogenous foods, these nourish,—if the non-nitrogenous, they wear their frames." (P. 24.) "Can we, when tubercular cough arises, believe that practice correct, which implies low living and debilitating physic?" (P. 28.)

Dr Hull maintains that it is at once absurd and barbarous to conduct consumptive patients to their graves, confined within close rooms, and breathing warm foul air; restricted to meagre diet till they feel the pangs of hunger; leeched, blistered, and made to swallow large quantities of physic. (P. 40.) He doubts whether the cold (catarrh?) and cough, which end in phthisis and the early grave, are abstractly fatal; and he expresses the belief that numberless cases are rendered lethal, as he terms it, through medical meddling. Foxglove is most hurtful, cod liver oil intolerable; and what is stated about its increasing appetite and promoting nutrition, about its molecules penetrating organised deposits, and bringing them under the influence of living parts, is all romance. If people will take something of the kind, let them fry and eat the liver of the cod itself. (P. 42.) Counter-irritants are often inconsiderately applied. They induce general disquietude and increase febrile erethism. (P. 66.) Opiates are injudiciously and most extensively abused; and the author's conviction is, that numberless lives are annually sacrificed through the use of opiate cough medicines. (P. 68.) Iodine and iodide of potassium, whether given internally or inhaled, are equally useless and hurtful. Chlorine vapour is also hurtful. Moist air, which has been recommended, can never do what pure fresh air can accomplish. (P. 75.) Creosote, Prussic acid, and naphtha are all equally useless, notwithstanding the eulogies which educated men have pronounced on these agents. (P. 177.)

Then who can believe that liniments of turpentine, or lotions of brandy and salt, or even the alcoholic lotion, recommended by one distinguished physician, to be applied over the chest, can have any effect in causing the contraction and cicatrization of vomicalized cavities. (P. 78.)

The great means by which phthisical patients may be expected to recover, according to Dr Hull, are by allowing them to breathe freely pure fresh air, to take horse exercise if they cannot walk, to eat animal food rather liberally than scantily, and to drink genuine London porter, if that celebrated liquor can be procured genuine (p. 72), or Prestonpans beer. (P. 130.) The hour of retiring to rest is the best time for a draught of heavy wet; and tincture of hop, from half a drachm to two drachms, may be added. If the beverage be suspected to be acid, from ten to thirty minims of *liquor potassæ* may be conjoined; ingredients, he remarks, which will not render the porter distasteful. Animal food, in short, with generous wine and malt liquor, are the great antiphthisical agents.

We must not, however, anticipate readers in the perusal of this small volume. It is written with considerable originality, without much regard to order, and contains many instructive illustrations of the doctrines which the author inculcates. The book is evidently the production of a gentleman of considerable learning, who has thought and studied much on the subject, and gives instruction in an agreeable manner. The author seems to laugh a little at the microscopical and chemical disputants of the day; and bestows on some of them the following hexameter:—

"Pepsin, seu ptyalin, chondrin, glutinve pyinve."

The Lectures by Dr R. Payne Cotton are chiefly intended to elucidate the method of distinguishing the disease in its different stages. The author has studied the subject carefully; and his instructions may be perused with advantage.

The Inquiry by Dr Turnbull forms a useful treatise, communicating clinical information on the comparative value of several strongly recommended remedies, and, above all, the administration of cod liver oil.

The author believes, with considerable confidence, in the curability of consumption, and advances his evidence for this belief in the second section of the present treatise.

The remedial instructions on which he most insists are attention to Diet, Clothing, Exercise, Regulation of Excretions; the prevention and removal of inflammatory conditions; and the use of remedies which promote changes in Tubercular Matter.

These remedies are Mercury, Iodine, Alkalies, and Cod Liver Oil.

The histories of thirteen instances of the disease are subjoined, showing the effects of Cod-Liver Oil upon the symptoms, and the state of the patients.

It is unnecessary to enter into any detailed analysis of the contents of this performance, or of the cases which it contains. When we have mentioned its contents, our readers, we expect, will have recourse to the treatise, and study for themselves the evidence which it furnishes.

On the merits and uses of the treatment by Cod Liver Oil, we decline giving any opinion. We know that it is quite unnecessary to give any opinion, and, were it not so, it would be altogether useless. Other methods of treatment have found, in the course of time, their proper level; and it would imply a distrust in Providence, to doubt that this one will do the same.

As a sort of practical commentary on all these publications, comes the Medical Report of the Hospital for Consumption.

The hospital, which has been recently erected at Brompton, admitted at first only thirty patients. It now receives eighty-five. Besides these, a great number of patients are either attended at their own homes by the officers of the Institution, or, if able, receive instructions and medicines for treatment.

From the first origin of the Institution, in September 1842, to the 31st December 1848, the entire number of cases received into the Hospital is 888; and of those treated as out-patients, 10,051. Of these 888 cases, 542 were males, and 346 females. Among 3,470 out-patients, treated between September 1842 and December 1848, 2,137 were males, and 1,333 were females. This, the reporters think, truly indicates, after making all proper deductions, a greater prevalence of phthisis among males in the metropolis than among females. In the provinces it appears to be different, the number and proportion of females being greatest.

We do not know that the relative numbers given under the heads of different occupations and trades convey much information as to the influence of these trades. They show the numbers of persons pursuing different occupations affected by consumptive symptoms. But unless we know the proportion which these numbers bear to the whole number of persons engaged in each trade, it will be impossible to form a just estimate. So far as the numbers given go, they show that among male patients the greatest numbers are furnished by clerks, warehousemen, shopmen, mechanics, servants, and labourers of various kinds; and, among female patients, the most numerous body is furnished by servants and persons engaged in within-door occupations, and milliners, dressmakers, and needle women. A large number, nevertheless (419), come under the category of no occupation, or under fifteen years of age.

On the average duration and fatality of the disease, the following inferences are given.

> "It appears that phthisis rarely proves fatal in less than three months, only one case being recorded as having been fatal within that period. The disease existed in 22 of the 215 cases for a period of between three and six months. Of these 22 cases, 11½ per cent. were males, and a little more than 7¼ per cent. were females. In 36 cases the disease lasted from six to nine months; of these, 19 per cent. were men, and 12 per cent. women. The disease existed for a period of from nine to twelve months in 30 cases, of whom about 15 per cent. were males, and nearly 12 per cent. females. The half-yearly periods, extending in the table from twelve months to four years, contain, in each period, with one trifling exception, a decreasing number of cases. For whilst we observe that nearly 17 per cent. of the cases have a duration of from six to nine months, not 2 per cent. are found in the period from three and a-half years to four. Fourteen persons, that is, 6½ per cent., lived for periods above four years. We observe, on examining the table a little further, that considerably more than half the entire number of cases were fatal within a period of eighteen months,—the numbers being 123 to 78. In reference to the influence of sex, we observe a remarkable fact, viz., that the disease is more rapidly fatal

amongst males than females. Thus, of the 123 cases which terminated within eighteen months, 89, or 60·5 per cent., were males; whilst only 34, or 50 per cent., were females. After a period of eighteen months, the duration is reversed,—of 78 cases, 47, or 31.9 per cent., were males, whilst 31, or 45·5 per cent., were females." P. 33.

The main point at present is to know the effects of treatment, and the comparative therapeutic powers of different remedies.

"*Results of Treatment.*—For the purpose of illustrating this important subject, the in-patients and out-patients, for self-evident reasons, are separately classified. The length of time during which the in-patients remain in the hospital, the subjects of close observation, affords ample opportunity for forming tolerably accurate conclusions respecting the degree in which the disease is amenable to treatment. This has been found to vary from simple amelioration to complete arrest. The patients are therefore classed according to the amount of benefit they have received; by the term *relieved* is implied a simple diminution or cessation of some of the more distressing symptoms, so long as the patient remained under observation; by *much relieved* is meant the removal of the principal symptoms,—the health of the patient, though improved, being still delicate; the term *arrest* (without entering into the question of the curability or non-curability of consumption, or defining these terms with reference to this disease) implies that all or nearly all symptoms of the disease have disappeared, the patients feel themselves well, and are able to pursue their ordinary occupations. In some of these cases the evidence of local mischief had greatly diminished, and in a few had disappeared; such patients being, in fact, scarcely in a worse position than they were before the attack. The other terms speak for themselves."—P. 33.

"From an examination of Tables 27 and 28 we find that nearly one-half the patients, both males and females, who seek relief in the first stage of the disease, obtain it to a limited extent. In about 40 per cent. of the cases the material benefit implied in the term *much relieved* is conferred, the sexes being in nearly equal proportions. In 12 per cent. of the males applying in the first stage of the disease, its progress appears to have been, for the time at least, if not completely, arrested; whilst in less than 7 per cent. of the females was the like result obtained. In 4 per cent. of the males, and in 4½ per cent. of the females the disease resisted treatment in this stage, and progressed rapidly to a fatal termination. In one case death occurred in this the first stage of the disease.

"In the second stage of the disease we find that about 60 per cent. of the males, and about 53 per cent. of the females, have the distressing symptoms under which they suffer more or less relieved; in about 23 per cent. of the first-mentioned sex, and 33 per cent. of the latter, a more material degree of benefit is conferred. The very small number of cases arrested in this stage is quite in accordance with what might have been *a priori* expected. When the softening process, characteristic of this stage of Pulmonary Consumption, has commenced, the formation of cavities is an almost inevitable result; the number of females slightly exceeds that of males, the converse of what occurs in the preceding stage: the numbers, however, are too few to justify any positive deductions as to the apparent influence of sex. The disease proceeded unarrested in about 13 per cent. of the males. We can only account for no females appearing under this head, by supposing that the disease had either been relieved or passed into the third stage before they came under observation; one death occurred in this stage in fifteen females.

"In the third stage, we find that in about 25 per cent. of both sexes the symptoms were mitigated by treatment; 16 per cent. of males, and 12 of females, in addition to the preceding, were very much benefited, and in a little more than 3 per cent. of males and nearly 4 per cent. of females, the progress of the disease was arrested. In about 20 per cent. of males and 25 per cent. of females, the disease progressed unchecked whilst under observation. In 33 per cent. of each sex who applied in this stage of the disease, death occurred. Viewing these results collectively, without reference to stage or sex, we find that benefit is conferred in 36 per cent. of the cases, material relief in nearly 25 per cent.; in nearly 6 per cent. the disease is arrested; and here it should be borne in mind, that the delay which occurs in the admission of patients, in consequence of the want of accommodation for the numbers who apply, allows the disease to advance, and thus renders the treatment more difficult and less successful than it would otherwise have been. Still, under such unfavourable circumstances, it is satisfactory to find that, in nearly 6 per cent. of the cases of this disease, considered by many to be beyond the reach of treatment, a result has been obtained, which a desire not to speak too confidently alone forbids to designate as cure. In nearly 15 per cent. the disease was unchecked by treatment, and was fatal in the hospital in 18½ per cent. of the cases admitted.

"*Results of Treatment of Out-Patients.*—Amongst these two distinct classes of cases are to be found—the consumptive and non-consumptive. As the report applies exclusively to the former, it will suffice to say that the latter is a very numerous one; for great numbers daily seek relief at the hospital, suffering, as has already been mentioned, from bronchitis and other diseases of the lungs, not tubercular; from heart disease; from disease and derangement of the digestive organs, simulating consumption; and from various other obscure debilitating influences. The majority of these cases become objects of solicitude; for, though they may not be at the moment actually the victims of pulmonary consumption, experience has shown that the diseases for which they seek relief, if neglected, render the system liable to its attacks. These cases are relieved in great numbers; and thus many victims are saved from the consequences of protracted disease and suffering. Anongst the consumptive out-patients, the results have been satisfactory, though it is difficult to ascertain them with accuracy, owing to the well-known habits of hospital out-patients, who, when they have obtained relief, are so anxious to return to their occupations, that they neglect to report their condition. The great distance* at which many of the patients live from the hospital contributes to the same result. It would be very desirable, indeed, if the subscribers, in giving letters of admission to out-patients, would point out to them the necessity of reporting personally, or by letter, to their respective physicians, before they cease to attend. From a number sufficiently large to afford pretty accurate conclusions, we find that, in the first stage, including males and females, the symptoms are more or less relieved, in about 35 per cent.; in about 33 per cent. they are much relieved; in 18 per cent. the disease appears to have been arrested; in 12 per cent. it passed into more advanced stages. Placing together the second and third stages, we find relief given in about 23 per cent.; in 24 per cent. the relief was material; and in 4½ per cent. the disease was arrested; in 48 per cent. it remained unchecked, or progressed to a fatal termination.

"When it is recollected that the average daily attendance of out-patients is 120, and that of the non-consumptive a large majority are cured,—that of the consumptive, more than one-half have their sufferings so much relieved as to enable them to pursue their usual occupations, even whilst under treatment, and many to have them removed altogether,—an estimate can be formed of the amount of benefit conferred by the charity, without any extended or illustrative comment.

"*Treatment.*—In making some observations on the treatment of consumption pursued at this Institution, the medical officers feel it a duty to bear testimony to the judgment evinced in the selection of a site for the hospital, and the excellence of the arrangements for promoting the health and comfort of the patients. To those unacquainted with the locality it will be necessary to say, that the hospital is built on a dry gravelly soil, in a suburb of the metropolis long celebrated for its salubrity, sheltered on the north and east by the whole of the metropolis, and open to the south and west; the wards are lofty, and of moderate size; the corridors light and capacious; whilst the coldness and dampness of our atmosphere, so highly injurious in diseases of the respiratory organs, are corrected by the method of ventilation devised by Dr Arnott, and which is so arranged as to supply warm fresh air in a continuous stream at the rate of 2,160 cubic feet per minute, thus allowing to each patient, during that time, more than 23 cubic feet. This air reaches the wards so modified as to keep them at the uniform temperature of nearly 65° in winter and summer. There is thus provided for the poor a climate nearly approaching that of the southern latitudes, the advantages of which can only be enjoyed by the more favoured portion of the community. The beneficial effects of these arrangements upon the patients are strikingly manifested in the great improvement which generally takes place in their symptoms soon after admission; the cough becomes less frequent and the expectoration diminishes; they lose the anxious expression of countenance frequently attending the disease, and strangers who visit the hospital often express their surprise at the quiet and comfort of the patients, and their comparative freedom from cough. It is proper to mention, that though a majority of the patients are sensible of deriving benefit from the warmth of the atmosphere of the hospital, certain individuals, owing to peculiarity of constitution or disease, find it oppressive. A similar statement applies to Madeira and like climates.

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* Many patients receive medicine from the hospital, attending in person occasionally, but living at distances, even within a circuit of some 50 or 60 miles or more.

"Of the strictly medical treatment of the disease a detailed description would be inappropriate in the pages of this report; the medical officers limit themselves, therefore, to a brief statement of the results of the use of a few particular remedies which have attracted attention.

"Much has been accomplished, especially at the early period of the disease, by acting upon those general principles which are familiar to every medical practitioner for strengthening the digestive powers, correcting pulmonary congestion, improving the condition of the blood, and administering those remedies which are considered suited to particular symptoms.

"*Naphtha.*—Amongst the medicines alleged to have curative powers, a fair trial has been given to pyro-acetic spirit or naphtha. There are some complications of phthisis, such as bronchitis, attended with profuse secretion, in which it has appeared occasionally to exert a favourable influence,—moderating the secretion, improving the appetite, and increasing the strength; but it was not observed to possess any specific power of suspending or ameliorating tubercular disease of the lungs, and in many cases it acted very injuriously.

"*Iron.*—The pale and anæmic condition of many consumptive patients, and the deficiency of red globules in their blood (as shown by experiments of Andral and Gavarret), naturally suggested to us, in common with the profession, the use of iron; especially as, when administered to the lower animals, this agent is stated to possess the power of arresting the formation of tubercles. It has been used in different stages of the disease, and in various forms, such as the iodide, phosphate, sulphate, sesquichloride, and citrate. During the first stage of the disease, in the absence of pulmonary congestion and hæmoptysis, it has been found useful to the extent of arresting its progress; but the utmost benefit which persons in the later stages have derived from this remedy are, an increase of strength and a temporary improvement of general health.

"*Cod Liver Oil.*—This substance is entitled to special notice, as having been productive of more good in the treatment of phthisis than any other agent yet employed. The earliest trials of this remedy made on a large scale were those instituted at the hospital; and it has now been given in many hundred cases. The results of all these, for reasons already mentioned, cannot be given, but its effects are shown in 542 cases.

"Of these 542 cases, 293 were in the first stage of the disease, and 249 in the second and third, or those stages subsequent to softening; of those in the first stage, 190 were males, and 103 were females. Applying to these cases the terms already used, it will be observed that 72 per cent. of the males, and 62 per cent. of the females, had their symptoms materially improved; in nearly 18 per cent. of the males, and in 28 per cent. of the females, the disease was arrested; in 10 per cent. of the males, and in nearly 10 per cent. of the females, the disease progressed unchecked. Of the 249 patients in the second stage of the disease, 139 were males, and 110 females. In 53 per cent. of the males, the symptoms were materially improved, and in nearly 61 per cent. of the females. In a little more than 14 per cent. of the males, and in nearly 14 per cent. of the females, the disease was arrested. In a little more than 32 per cent. of the males, and in 25½ per cent. of the females, the disease was not arrested. Viewing these results collectively, we find in about 63 per cent. the symptoms improved; in 18 per cent. the disease arrested; and in 19 per cent. it went on unchecked. When it is recollected that of the whole number treated at this hospital, the disease was arrested in only 5 per cent., the value of this remedy, under the use of which the disease appears to have been arrested in 18 per cent. of the cases, must be considered very great.

"Diffierent qualities of oil have been tried, without exhibiting any marked difference in their remedial effects; but the offensiveness of some of the darker kinds renders their general use impracticable. The oil now used is straw-coloured, transparent, and free from offensive smell. Patients in general take it without repugnance. The dose at first is 1 drachm three times a-day for an adult; but it is gradually increased in some few cases to 1½ oz. for a dose. It is usually administered in camphor-water, any aromatic water, bitter infusions, milk, or any other agreeable fluid. When there is great irritability of stomach, it has been given in mucilage of gum, with a few drops of hydrocyanic acid. In cases where there existed great anæmia and debility, and in those where the effect of the oil seemed slight, preparations of quinine and iron, especially the iodide, have been conjoined with advantage. It has appeared advantageous to intermit its use for a few days when nausea and feverishness, from whatever cause produced, are present. In certain cases the use of the oil has been continued during the existence of slight hæmoptysis, without producing any injurious results.

"Other animal oils (not derived from the liver) and vegetable oils have been tried, with a view of ascertaining how far their operation resembled that of cod liver oil. The experiments hitherto made have not shown them to possess the same powers; but they have not been as yet sufficiently often repeated to warrant decided conclusions.

"One of the most striking effects of the use of cod liver oil, is an increase in the patient's weight.

"From results obtained from 219 cases of consumption treated by Cod Liver Oil, it appears that, taking both stages of the disease and the sexes collectively, a gain of weight occurred in 70 per cent., a loss of weight in only 21 per cent., and in about 8½ per cent. the weight remained stationary. The amount of the increase varied; being in some patients little more than one or two pounds during several months; whilst, in many, the average increase was from one pound to two pounds weekly during several weeks. Some very remarkable instances of great increase of weight have presented themselves. Thus, in one instance, 41 pounds were gained in 16 weeks; in another, 19½ pounds were gained in 28 days, and 10 pounds in the succeeding 10 days; in another case, 29 pounds were added to the patient's weight in 31 days. It must be observed, that an amelioration of the symptoms did not invariably follow an increase of weight, though the exceptions were rare. An aggravation of the symptoms and a diminution of weight were almost invariable coincidences. In a few cases the symptoms improved, though the weight remained stationary, or even became slightly diminished. It is right to mention that in some of the cases marked stationary in the Table (XXX.), the first effects, though encouraging, were not permanent. In other cases, where the amelioration was still more considerable, and the progress of the disease appeared to have been stayed, relapse occurred, and was followed by rapid progress to a fatal issue. That such cases do occur requires to be remembered, in order to restrain too sanguine expectations, and to prevent the remedy from falling into the discredit which disappointment after an unlimited confidence may induce. On the other hand, without entering into a description of the successive steps of amelioration experienced by patients (which have been already described under the head of Results of Treatment), it will suffice to say, that many of the cases included in the 18 per cent. in whom the disease is marked arrested, felt themselves as well as they had been before the attack of the disease. In some of these cases there was, as already stated, a decided and progressive diminution in the local mischief. Comparatively few of such cases having returned to the hospital after a lengthened interval, it is not too much to assume that the improvement is permanent,—it is so in some cases which are under observation.

"From these facts and a more extended experience, since the period at which this report terminates, no other conclusion can be drawn, than that cod liver oil possesses the property of controlling the symptoms of pulmonary consumption, if not of arresting the disease, to a greater extent than any other agent hitherto tried.

"*Inhalations* have been tried under a variety of circumstances, and with benefit to some of the distressing symptoms, such as cough and difficulty of breathing. Experiments, with a view of ascertaining the simplest means of using these agents, being now in course of trial, remarks on their use are reserved for a subsequent report.

" *Counter-irritation* has been found useful in many cases in which local congestion existed, or in which cough and abundant secretion were distressing. In many of these cases, a solution of iodine and iodide of potassium in alcohol, sufficiently strong to produce vesication, applied with a camel's hairbrush, was found remarkably beneficial.

" Night sweats have been relieved in very many cases, by the use of gallic acid in doses of five or six grains, combined with morphia; in the treatment of diarrhœa, recent experience has shown that the trisnitrate of bismuth, when perseveringly administered, often proves a most safe and effectual remedy."

The statements now given are in various modes useful. They stand as memorials of experiments made on a disease most unmanageable, and most commonly tending to the fatal termination, and of experiments made with remedies, to which successively different degrees of antiphthisical power have been ascribed. It would be unseasonable at present to expect that the true merits of different remedies and different modes of treatment could be at once ascertained. It will be sufficient if, after the lapse of some years, this be accomplished.

Dr Hull entertains a strong objection against an hospital for consumption, because he says that, by collecting so many phthisical patients in one place, the air is seriously contaminated, and not only are they mutually preventing each other from breathing good fresh air, the most likely means of recovery, but this may give rise to the disease in the healthy. That phthisis is a contagious malady, we cannot believe. But we can understand the validity of the objection of Dr Hull; and we think it would be desirable to keep within the hospital as few sufferers under this disease as possible, in order that all may have the most liberal supply of pure air. Phthisical patients probably will have better chances of recovery, if they reside in country districts, remote from towns and from all those multiplied causes which contaminate the air in towns, than near cities, or where the population is dense and crowded.

The dispensary system upon a small scale, and widely dispersed, seems best suited for doing good among consumptive persons and those threatened by the disease. The hospital at Brompton, by visiting out patients, combines this advantage as far as is practicable.

One of the most useful services of such an hospital and its out-visiting staff would be to afford patients, in the first and earliest stages of pulmonary disease, that assistance which is too often unavailing later periods.

ART IV.—1. *Essay on the Use of Alcoholic Liquors in Health and Disease.* By JOHN CHADWICK, M. D., Licentiate of the Royal College of Surgeons, Edinburgh. London, 1849. 12mo. Pp. 123.

2. *On the Use and Abuse of Alkoholic Liquors in Health and Disease.* Prize Essay. By WILLIAM B. CARPENTER, M. D., F. R. S., F. G. S., Examiner in Physiology in the University of London, and Professor of Medical Jurisprudence in University College. London, 1850. Post 8vo. Pp. 283.

3. *Temperance and Total Abstinence, or the Use and Abuse of Alkoholic Liquors in Health and Disease.* By SPENCER THOMSON, M. D., L. R. C. S. E., &c. London, 1850. Post 8vo. Pp. 184.

THE discovery of the art of preparing fermented liquors, and that of distilling from them the spirituous element, upon the presence and amount of which chiefly their intoxicating properties depend, has certainly proved the most pernicious to the human race that could be devised. The use and the abuse of these articles,—for use is much the same in this instance as abuse,—have aggravated the real evils of the human race to so great a degree, that it is scarcely possible to ascribe to any other single agent so much physical and moral evil. They have increased the number, and added vigour to the power of the diseases liable to assail the human body. They have caused disease of long duration, and have aggravated diseases of rapid course. They have proved the prolific and certain parents of poverty, idleness, and crime. They have filled workhouses, hospitals, jails, and penitentiaries. They have paralyzed the members of the poor, and deranged the intellects of the wealthy. They have been directly and indirectly the means of sending immense numbers to penal colonies. Their influence in supplying the gibbet, it is not easy accurately to estimate.

It is, nevertheless, not quite philosophical or just to ascribe all vices to the use of spirituous liquors. They are poisonous agents; and the habit of taking them is itself a sin and a crime. The practice of voluntarily taking what may deprive a person of his power of self-control; which destroys for the time his reason, perverts all his natural affections, and brings out into strong relief all the evil and demoniacal principles of the heart,—implies that the intellect is itself previously disordered, and the soul of the individual is so contaminated, that it is no longer capable of guiding him in choosing the right and avoiding the wrong. To say, therefore, that the habit of drinking is the cause of vices and crimes, is merely to say, that the individual has vicious and criminal dispositions, and that he voluntarily persists in fostering them, and allowing them to obtain over him unlimited dominion. In many more cases than is usually supposed, it is vice that leads a man to drink; and though he may perpetrate enormities when in the state of intoxication, yet surely, when he knows the effects of that state, it shows that his mind is first corrupted, and his moral faculty depraved, before he proceeds to place himself in what may be denominated the actual vicious position.

It is natural to expect, that, when it is considered that immense numbers of mankind in all countries use these poisonous articles habitually and incessantly, and seem in this respect to be in a state of constant mental derangement, attempts might be made by the more reflecting part of the human race to put some effectual stop to the practice. Accordingly, it is well known, that temperance societies, total abstinence societies, pledge associations, Rechabite associations, and all sorts of contrivances calculated to act on the animal, have been for many years in use, and have laboured hard to put a stop to habitual drinking. Of those means to check a pernicious and immoral practice, it is not our intention to disapprove. They may be useful in the absence and difficulty of applying checks of more elevated and more suitable character. They are all inefficient and improper, in so far as they are mere mechanical contrivances to accomplish, by coarse and sensible measures, that which can only be properly and effectually done by moral agency. They act on the lower and animal propensities rather than on the natural and moral faculties of mankind. The virtue that is kept by means of a pledge or promise made to some other person may be a very decent sort of virtue in the eyes of mankind, and may even be productive of useful results; but, so long as it is unconnected with the feeling of responsibility as a moral agent, it is liable to be disconcerted, and to give way completely before many of the accidents and emergencies of life. To attempt to render men sober and temperate by means of oaths, promises, obligations, and pledges, by society distinctions and medals, is to convert them into mere machines, or almost into animals to be ruled by bit and bridle. The only rational and effectual method of banishing drunkenness, is by showing mankind that it is their interest to abstain from a vice so degrading: that they possess in themselves, as beings endowed with reason and judgment, the complete power of doing so; and that sobriety and temperance furnish means of enjoyment, both more permanent, and of a more agreeable and useful character, than that state of excitement and confusion which is maintained by the constant use of vinous and spirituous stimulants.

But, say the advocates of what is called moderation in the use of fermented liquors, we are entirely opposed to drunkenness. Of that no person in his senses can approve. But the moderate use of wine and similar fermented liquors is not only free from harm, but it is useful and necessary. This we believe to be one of the great stumbling-blocks of the present day as to the stoppage and suppression of habits of drinking. It is altogether impossible to say what is moderation and temperance in the use of many of these articles. We have heard more than one person, esteemed sober and temperate, declare, that a bottle of wine is nothing to a person in health; that it never affects either head or stomach; and, it is a well-known fact, that many persons take daily fully one pint of that liquor, and wonder that there can be anything wrong in it. Then it is utterly forgotten, and seems never to be thought of by many persons, that the liquor called wine is not wine, but a most artificial compound, about one fourth of which is ardent spirits. To apply the name of wine to such articles as are sold by wine merchants in large cities in Great Britain, is a most grievous abuse of language. All of them are mingled and coloured brandies, spirituous compounds manufactured for making money, and stupifying the faculties of those who use them. To put a stop to the use of such poisonous agents can be done in no other mode than by showing, that they are not only unnecessary to health, as is usually supposed, but most hurtful; that they act as poisons of different degrees of rapidity of action; and that to use them is both a piece of folly and a great crime.

We have spoken of the means already adopted to suppress habits of drinking. We have now to direct attention to one which seems to be free from the objections already stated, and calculated to produce beneficial effects in the proper way and upon just principles.

On the first day of January 1848, Mr Eaton, a benevolent gentleman, interested in the promotion of temperance on rational principles, signified his resolution to give a prize of one hundred guineas to the author of the best essay on the use of alkoholic liquors, in health and disease. The persons whose signatures appeared at the announcement stated that the essay must contain answers to the following questions.

"1*st.*—What are the effects, corporeal and mental, of Alkoholic Liquors on the healthy human system?

"2*d.*—Does physiology or experience teach us, that Alkoholic Liquors should form part of the ordinary sustenance of man, particularly under circumstances of exposure to severe labour or to extremes of temperature? Or, on the other hand, is there reason for believing that such use of them is not sanctioned by the principles of science, or the results of practical observation?

"3*d.*—Are there any special modification of the bodily or mental condition of man, short of actual disease, in which the occasional or habitual use of Alkoholic Liquors may be necessary or beneficial?

"*4th.*—Is the employment of Alkoholic Liquors necessary in the practice of Medicine? If so, in what diseases, or in what form and stages of disease, is the use of them necessary or beneficial?

"1. Each Essay must be accompanied by a sealed envelope, containing the real name and address of the author, and superscribed with a name or motto, similar to that attached to the Essay; only the envelope of the successful candidate to be opened by the Adjudicators.

"2. It is desired (but this is not an essential point) that the Essay should not extend beyond 250, nor fall short of 120, pages of print of medium size octavo.

"3. The Essay must be written in a clear, legible hand, on one side of the page only; and must be delivered to the undersigned address, on or before the 31st day of December, 1848.

"4. The successful Essay will remain the property of the Donor of the Prize, and will be published." Pp. ix., x.

About the close of 1848 (21st December), the adjudicators having learned, as is understood from the fact of a small number of inadequate essays having been offered for the competition, that due publicity had not been given to the conditions of competition, announced that the period for the reception of essays was prolonged to the 1st October 1849, after which the adjudicators would immediately proceed to examine the essays, and pronounce their judgment.

Meanwhile, Dr Chadwick, who had composed an essay for competition, and was unwilling, as he states, that an essay which was completed, and ready to be sent to the recipients, Mr Gilpin and Mr Beggs, should lie useless, that is, as we understand, silent and unread in his desk, so long as nine months, determined to publish it. He asked, indeed, the question from the recipients, whether a printed book with the author's name attached would be reviewed by the adjudicators in competition with manuscript essays. To this these gentlemen answered in the true diplomatic style, that they could only refer him to the prospectus and the adjudicators.

Dr Chadwick published his essay; and in this manner, as we understand, gave up the chance of competition.

When the period of adjudication arrived, fifteen essays were found to be then delivered, and the gentlemen appointed to this duty pronounced their decision. This decision awarded the prize to an essay, which was found to be written by Dr W. B. Carpenter, and the adjudicators felt it their duty to record their opinion of the great merits of an essay, having the motto, *Quot homines tot sententiæ*, and to speak in terms of commendation of another essay, distinguished by five mottoes, the first of which is, *How use doth breed a habit in a man.* The former of these two is the essay by Dr Spencer Thomson, which is now also before the profession. We are not aware that the latter has yet been published.

On two of these publications it is unnecessary to express any opinion. On these, indeed, judgments have already been pronounced, so that it becomes entirely superfluous to say one word on this score. All that we conceive it requisite to do is, to notice, in a general manner, the contents of each.

The treatise of Dr Chadwick communicates a good practical view of the subject. He considers the poisonous effects of alkohol, examines its useful effects in certain states of the system, and in peculiar conditions of great corporeal exertion, and under great mental depression; then he examines the diseases produced by the use of alkoholic liquors, various morbid states, aggravated by their use and their effects, in inducing general weakness. He then shows that spirit is not necessary as a stimulant or condiment; that water is the natural drink of the human race; that wine is not needed during old age; that its use, in medicine, is very limited, and should never be allowed, unless under the advice of a medical attendant; and concludes with some observations on its uses in certain states of great depression and debility.

Dr Chadwick has done us the honour to quote from this Journal a passage, the object of which, along with a passage from a contemporary Journal, is said to be, to show that the whole of the medical profession does not understand the effects of alkoholic drinks. We scarcely know whether this is to be taken as a compliment or a censure,—as applicable to us, or to those of whom we have occasion to speak. But Dr Chadwick will probably permit us to say, that if he reads the pages of this Journal regularly, he will find many instances in which we have taken occasion to speak, in language intelligible enough, of the bad effects, both of the use and the abuse of strong liquors. In the army, in the navy, and in civil life, at home and abroad, in the colonies and in the mother country, we have never ceased to point out the multiplied and serious evils which the practice has engendered and perpetuates.

The work by Dr Carpenter is the most comprehensive of the three. The author has considered the subject with great attention and judgment, and he has introduced many interesting illustrations of the lessons which he inculcates. Without declaring himself, either for or against the total abstinence system, he examines impartially the uses and abuses of vinous and spirituous stimulants, and he specifies in a cautious manner, the instances in which the use of stimulants is admissible, and may be required in the treatment of diseases.

The Essay by Dr Spencer Thomson presents a valuable and compendious view of the question. He communicates much useful information on the physiological and poisonous effects of alkohol and alkoholic liquors on the textures and functions of the human body. (Chapters I.—VII.) He then considers the use of alkoholic liquors under peculiar circumstances and in certain conditions of the human frame. (Chapters VIII., IX.) Next follows an inquiry into the employment of these liquors in medical practice and in the treatment of various diseases; and, lastly, come some remarks on the use of water and various aqueous infusions, as tea and coffee, and their effects as drinks.

So far as we can perceive, all the three authors are impressed with the necessity of the moral check and moral agency alone being the great means of putting an effectual stop to habits of drinking. All proceed on the ground that it is possible to instruct the labouring classes on this subject, and make them understand that they have it entirely in their own power, without temperance, or abstinence, or pledge societies and engagements, to be perfectly sober and temperate, perfectly moral, and much happier than if they were adopting an opposite course.

These works are calculated to produce beneficial effects, by placing the question of the uses of alcoholic liquors upon the proper foundation. If they could be read by those most interested, they cannot fail to convey conviction. The principles which they inculcate have been long known to the profession. But, in order to be useful, they require to be known to the public at large.

Art. V.—*A Physician's Holiday, or a Month in Switzerland in the Summer of* 1848. By John Forbes, M.D., F.R.S., Physician to her Majesty's Household. With a Map and Illustrations. Second Edition, Revised and Corrected. London, 1850. 8vo. Pp. 350.

Dr Forbes proceeded by one of the most frequented routes from London to Ostend; thence by the Dutch, or rather what should be termed the Belgian-Rhenish Railway, to Cöln on the Rhine. Thence he proceeded to Bonn; thence by the Rhine to Coblentz and Mainz. From Mainz, or rather from Cassel, on the right bank of the river, he proceeded by railway to Frankfort, to Heidelberg, Baden-Baden, Kehl, Strasbourg, and Basel. Here he was on the borders of Switzerland, and ready to enter the mountainous country.

He then proceeded to Schaffhausen and beheld the falls of the Rhine; to Zurich, and eventually to Arth, at base of the Rigi group of mountains. He then ascended this celebrated peak, and had from it both a sunset and a sunrise view. From the base of the Rigi he proceeded by the Rossberg and Einsiedeln to Rapperschwyl on the Lake of Zurich, across the lake by steam-vessel to Ragatz, to Chur, Reichenau, and across the valley of the two branches of the Upper Rhine. It is at this spot, indeed, that the Fore Rhine and the Hind Rhine, or what form its northern and southern branches, meet. The Hinder, or Southern Rhine, passes through a ravine or rocky cleft called the Via Mala, which, however, is so much improved by removal of obstructions, levelling, and tunnelling, that it is one of the best and safest roads of Switzerland, with only a very moderate degree of ascent.

The course was thence back to Chur and Ragatz, and to the baths of Pfeffers. Of this place and its situation, an interesting description is given. The springs, which are three in number, issue about one furlong from the place where they are used. The middle spring, which is the most copious, is the only one used. Its temperature is 98½° to 99° of Fahrenheit. The supply from this spring is distributed to two places,—to Bad-Pfeffers, in the proportion of 855°; to Ragatz, in that of 570°. It is used both internally and externally. But Dr Forbes thinks it can be of little efficacy in most chronic disorders.

At Lenthal, and along the valley to Stachelberg, Dr Forbes saw many Cretins labouring under their twofold affliction of goitre and idiocy. Of an alkaline sulphurous spring at Linthal, Dr Forbes speaks in favourable terms.

The course was next directed to Sarnen, Schwartzwald, the Schreckhorn, the Jungfrau, and to Abendberg. At the latter town, he visited the Cretin establishment, conducted by Dr Guggenbuhl, and of the mode of managing and educating these unfortunate sufferers, Dr Forbes gives an interesting and instructive account. Dr Forbes thinks that between goitre and idiocy there is no necessary connection; and the old theories of the causes of the disease, from snow-water and similar circumstancs, have been abandoned as untenable. The disease, in the absence of other causes, he thinks, must depend on some miasma or malaria. The prevalence of the disease appears to be on the decline.

The course was next to Leukerbad, of the baths of which an account is given, with some judicious observations on the comparative value of hot and cold bathing. The temperature of the different springs of Leuk varies from 94° and 99° to 124°, which is the highest.

From Leuk the author proceeded southwards along the Wisp to the Mutterhorn and Riffelberg, thence back by Vispach to the Valley of the Rhone. He is now in the country of the Glaciers, and makes some useful observations on these bodies, and on the peculiarities of Glacier water. The subsequent course of the journey is by Geneva, its lake, Iverdun, Neuchatel, the Lake of Neuchatel, and then to Basel, the point at which he entered the mountainous country.

We have given this short sketch of the course of Dr Forbes, to show readers the extent of ground he has traversed, and the important objects which he has visited in the course of one month. It is impossible to mention all the interesting matters which have come under his observation. But we may say, that whatever he has seen he has described accurately, and produced a volume which cannot fail to be read with great interest. Tourists in Switzerland will find it useful as a companion; and to those who cannot visit that country, it will afford both entertainment and information.

ART VI.—1. *On Ringworm, its Causes, Pathology, and Treatment.* By ERASMUS WILSON, F. R. S., Consulting Surgeon to the St. Pancras Infirmary. London, 1847. Post 8vo. Pp. 102.

2. *On the Management of the Skin as a Means of Promoting and Preserving Health.* By ERASMUS WILSON, F. R. S. Third Edition. London, 1849. 12mo. Pp. 238.

In the first part of these performances, Mr Wilson gives a careful and correct history of the different forms of ringworm; one or two of which have already attracted much attention, in consequence of the researches of Gruby, Mahon, and Malmsten.

Mr Wilson describes only two forms of ringworm; the Favus or Honey Comb ringworm; and the *Trichonosos Furfuracea* or common ringworm.

Mr Wilson is rather opposed to the idea that Favus is either propagated by the sporules of a cryptogamous plant, as maintained by Gruby, or that it is contagious; and he adduces various arguments which, with his own investigations on the subject, have forced on his mind the conclusion that Favus is not contagious.

As to treatment, he adopts the method recommended by MM. Mahon, namely the lotion of quicklime, sub-carbonate of potash, and charcoal. This is in truth pretty strong potass ley.

Mr Wilson is equally averse to admit the cryptogamous origin of this disease as that of the Honey Comb scall. In this certainly both Gruby and Malmsten, as we have seen, are quite decided. This, however, is not the only instance of diversity of opinion where the objects are microscopical. Mr Wilson is also disposed to consider this form of the disease as void of contagious properties as the other.

Mr Wilson next treats of diseases analogous to, and liable to be mistaken for, Ringworm. Of these the first is *Plica Polonica*, or Polish Ringworm, which he maintains is entirely analogous to the common Ringworm of this country. Then comes baldness in patches, or what the author calls *Alopecia Areata;* the *Area* of Celsus; the *Ophiasis* of the Middle Ages; and the *Porrigo decalvans* of Willan. This disorder, Mr. Wilson maintains, is entirely different from Ringworm. In truth, if his views be correct, it is not a disease of the skin at all, and not even of the structure of the hair, if any reliance can be placed on microscopical examination. He allows, however, that at the larger end the texture of the hair looks softer than natural, that the slender part is lighter in colour than the other hairs, and that it is obviously deficient in pigment. The cause of this change in the hair he regards as defective nutrition, produced by confinement to the house, extreme labour, mental anxiety, and similar circumstances, that tend to impair general health. He gives an interesting case, in which it appears to have been induced by mental anxiety and distress. We have seen it take place in persons of what are called strumous disposition.

In the treatise on the management of the skin, Mr Wilson gives an interesting view of the healthy structure and functions of that membrane, especially as an organ of insensible perspiration; of its papillæ, o. the follicles, or what he calls the oil-glands, and of the hairs.

He then examines the influence of diet, of clothing, of exercise, of cleanliness, on the health of the skin, and shows, in a very clear and forcible manner, the beneficial effects of ablution and the use of the bath.

He lastly gives a useful sketch of the various diseases to which the skin is liable, and explains their appropriate treatment.

This treatise is of a popular character; and is well calculated to diffuse among the public in general, correct notions on the necessity of attention to the state of this important organ.

PART III.

MEDICAL INTELLIGENCE.

I.—ETIOLOGY AND HYGIENICS.

On Ozone, the supposed cause of Zymotic or Endemic and Epidemic Disorders. By M. BECQUEREL, Senior, and M. SCHOENBEIN of Bâle, Switzerland. (Archives Generales, Fevrier 1850, p. 236.)

At the meeting of the Academy of Sciences, held on the 14th January 1850, M. Becquerel, senior, communicated some observations relative to OZONE, a new substance which has excited some interest in consequence of its being believed to be the main cause of epidemic and zymotic disorders. This substance was discovered by M. Schoenbein of Bâle, already known as one of the claimants for the discovery of explosive cotton. It is named OZONE, in consequence of its strong and offensive odour (Οζω, *oleo.*)

M. Schoenbein, says M. Becquerel, procures Ozone in large quantity by placing in large glass flasks from 10 to 15 litres in capacity, a small quantity of water, and a few rods of phosphorus of one centimetre in diameter, in such a manner that they are half immersed in water, half exposed to air, by raising the temperature from 15° to 20°, and closing incompletely the glass vessel. When the operation is completed, which is known by the odour diffused by the *ozonized* air, the glass vessel is inverted in a tub or large cask of water, in order to remove the sticks of phosphorus. Then the flask is withdrawn and agitated, in order to wash the compound. This second operation being completed, the operator adapts to the glass vessel a cork through which pass two tubes, one serving to convey water into the vessel, and the other to transmit the ozonized air into the vessels or tubes, containing substances subjected to its action.

Ozone when it is concentrated has the odour of chlorine; when it is mingled with air it has the odour which is disengaged when we turn the cylinder of an electric machine. Air strongly charged with ozone embarrasses respiration, and produces, according to M. Schoenbein, catarrhal affections. Small animals immersed in it die speedily. Ozone is insoluble in water. It destroys organic colouring matters, as well as ligneous and albuminous articles. According to M. Schoenbein, ozone is the most powerful oxydating agent in nature.

Ozone being constantly formed in the air by the action of artificial electric discharges, ought, in like manner, to be produced in the atmosphere whenever there are natural electric discharges. Nothing is more easy than to ascertain the presence of OZONE in the atmosphere, and the variations in the quantities produced, by means of paper impregnated with sulphate, or with chloride of manganese. The ozone rapidly decomposes the salt of manganese, and the paper acquires a brown colour. In general the reaction is greater in winter than in summer. M. Schoenbein has uniformly observed, that during a fall of snow it is greatly more intense than at other times.

This substance has hitherto resisted all means of analysis. M. Marignac considers it as a peculiar modification of oxygen, which exalts its chemical affinities; and M. Schoenbein regards it as hydrogen in a superior degree of oxydation, that is, as a body containing probably more oxygen than oxygenated water.

Observations on the effects of the Leste or Dry Wind of Madeira on the Animal Economy; with remarks on the relative effects of dry and moist air in Diseases of the Lungs. By Dr A. Mason. (A Treatise on the Climate and Meteorology of Madeira. London, 1850. Cap. xii., p. 149.)

Dr Mason divides the inhabitants of Madeira, in considering this subject, into three classes.

1. Natives, or foreigners, long resident in the island.
2. Invalids who may have lately arrived, and with whom the climate agrees, and persons in health.
3. Those who feel its beneficial influence, and in whom the general condition of the atmosphere produces injurious results.

First, Residents of long standing, and in health, do not experience any ill effects beyond the annoying sensation of general heat and oppression. The surface of the body is dry, perspiration appearing to be thoroughly arrested; the lips and nose feel as though they suffered from a recent cold. The looks of these persons perfectly accord with their sensations during the continuance of this wind; still they do not avoid quitting their houses, though they always close both the windows and doors. Birds and insects seem to suffer more or less, and fowls, confined in a close yard, are generally observed to droop.

Second, Delicate people, or persons in health, lately arrived, find their breath hot, their lips parched, while their faces and such other parts of the bodies as are exposed to the air, feel as though they were frost-bitten, and compare their sensations to what they have experienced in a northern climate, when exposed to a keen easterly wind on a frosty day. Pains in the head are generally complained of, as well as great thirst and general languor, with a feeling of faintness, loss of appetite, and inability to take their accustomed exercise, whether within or without doors. These results are accompanied with an unusually irritable state of the mind. The moment this wind approaches, the change which it effects on the conditions of the atmosphere is perceived, and every one feels as if he were suddenly transported into another climate. Both natives and strangers partake plentifully of lemonade and other cooling drinks, which, however, produce only a momentary effect in allaying the painful sensation of thirst.

Third, Those with whom the *Leste* agrees, do not complain of heat or thirst. They feel cheerful and much exhilarated in spirits; they can take much more exercise, without feeling any languor, or being in a state of sensible perspiration, which, in ordinary weather, is always the case with them.

This was particularly exemplified in myself, and although the temperature was so high that, in the ordinary condition of the atmosphere, sensible perspiration would have been induced even when at rest, I could now take three times as much exercise, and remain quite free from moisture on my linen or even skin, feeling dry and comfortable, without the least sensation of languor or oppression. In the customary state of the atmosphere, during my residence at Madeira, even after a very moderate degree of exertion, I was always obliged to change my flannel and body linen, as I was bathed in perspiration, never unattended by a great degree of languor and lassitude.

These phenomena will be easily solved, when we consider that the insensible perspiration, both by the skin and lungs, will be from eight to ten times greater than in the ordinary condition of the atmosphere; and that, from the lungs alone, there is an increase of aqueous vapour given off, to the amount of 3 oz. 12 drs. 12 grs. in twenty-four hours. It is no wonder, then, that in the case of persons in health, and of those to whom the increase of evaporation from the lungs and skin would be injurious, this sudden and almost momentary transition from humidity to extreme dryness, should be followed by palpable effects, and those either of an inconvenient or pernicious nature.

The same phenomena take place in our own climate, although, apparently, under circumstances diametrically the reverse; but, from calculation, we find that dry frosty weather exerts the same influence on the human body; its own temperature determining the effect of the hygrometric condition of the atmosphere.

On the other hand, it is easy to imagine the beneficial results likely to accrue in an opposite constitution; viz., that, where evaporation from the skin and lungs would be serviceable, such a condition of the atmosphere would tend most powerfully to promote the recovery of the patient.

What I advanced, in a former part of this work, respecting the criterion whereby the suitableness or unsuitableness of the Madeira climate may be ascertained, may now be fully appreciated; and, accordingly, it may not be improper to re-state it. Those who, on their arrival, find that the *Leste* agrees with them, had better immediately remove to a drier climate; while those with whom it materially disagrees, as indicated by the symptoms which I have described, may rest assured that they will derive permanent benefit from remaining,—that their hopes will not be blighted,—but that returning health and strength will result from leaving, for a season, their own less hospitable climate. As regards a suitable climate for the two opposite kinds of constitutions, namely, that which agrees with the *Leste*, and that upon which it operates unfavourably, we must bear in mind that, every other condition being equal, the quantity of water given off from the lungs and skin by perspiration, or by evaporation, must be proportionate to the dryness of the air; hence the utility of multiplied hygrometric observations in different countries, and in various localities in the same country. All pulmonary diseases being modified by the hygrometric state of the air;—in affections of the lungs, attended by an excessive secretion; or in diseases of the skin, where the lungs are called upon to act more vigorously; or in any case where the cells of the lungs are obstructed from infiltration or otherwise; a dry temperate air will prove to be the most serviceable.

On the other hand, if there be diminished secretion from the lining membrane of the lungs,—as a dry air will irritate this membrane, by removing the portion of aqueous vapour necessary for the maintenance of its healthy action,—a warm moist atmosphere will be of the greatest utility, as it contains more aqueous vapour, and will, consequently, abstract less vapour from these organs. The skin under these circumstances will be also restrained from throwing out a superabundance of those aqueous particles, a due retention of which, within the body, is necessary to the maintaining of a healthy action.

Where *a very humid* condition of the atmosphere is required, the nearer its temperature approaches to that of the body, when the hygrometer, in other respects, indicates moisture, the closer will be the approximation to those conditions which are likely to benefit the patient,—provided all other things be equal.

On the other hand, where a *dry* air is required, much will depend upon the capability of the individual in generating heat; as air will be the more dry, the further it is removed from the mean temperature of the body. For, as we have already shown, provided an individual always maintain a sufficient temperature, the hygrometric condition of the air, as regards its

distance from the point of saturation, would make little difference in the amount of vaporous perspiration; for, although saturated, being colder than the body, it will become comparatively dry when raised, many degrees, by inhalation, or external contact.

To place an individual under the most favourable circumstances for his recovery, appears, at first sight, to be an easy task, as all that seems necessary is the consideration of temperature; but the case is different if we recollect that the terms, heat and cold, are purely relative ones, when applied to the animal economy; and not only with reference to different species, but to individuals of the same species, when existing under a peculiar state of the system. We know that the quantity of heat generated, bears a relation to the quantity of oxygen consumed; and that the acceleration of respiration is a powerful agent in counteracting the effects of cold; but this acceleration has its limits, as it may diminish, but cannot compensate for, the effects of excessive cold. Now, since there is a range of temperature, the variations within which scarcely influence the rapidity of the respiratory movements; and since this latitude is greater or less according to the constitution of the individual, it is of importance that it should be ascertained with the greatest precision; because if we know the kind of constitution which, in the variations of external temperature, preserves, more or less, that rhythm of respiratory movements, which characterises health, we shall be the better able to maintain it; or when it is deranged, either by the conditions of the system, or by the hygrometric state of the atmosphere, we shall be the better enabled to place the individual in that locality which will most conduce to its re-establishment.

But, as in cases of small or diseased lungs, the oxygen consumed is not sufficient to enable the individual to produce the necessary degree of heat, it is evident that, howsoever beneficial a dry state of the atmosphere may prove in other respects, to place him under a range of temperature lower than what is absolutely necessary for healthy action, would only operate in inducing a tendency to general inactivity.

From these facts it follows, that, when an individual experiences such a change of constitution as diminishes his power of producing heat or consuming air; a drier atmosphere being required, he can only be placed under the most favourable circumstances for recovery, by resorting to a milder climate, in which the hygrometer indicates that the atmosphere is very far removed from the point of saturation, or by effecting that condition through the employment of artificial means.

With regard to the electrical condition of the atmosphere, as I have alluded to Dr Heineken's remark, that the electrometer is very feebly effected, I have nothing further to offer. A knowledge of the electric condition, during the prevalence of the hot dry winds, would be very interesting. As far as sensation can indicate that state, I should be inclined to think that it was abundant, having suffered very severely from the *Leste* after being much exposed to its influence during some of my experiments on the subject.

In the ordinary condition of the atmosphere at Madeira, I generally experienced a depression of spirits with general languor. On the other hand, during the prevalence of the *Leste*, my spirits were very much exhilarated; and, although the temperature was 86°, I never felt any languor, but, on the contrary, such a general alacrity and vigour about the whole system as I never experienced under any other circumstances.

On the 22d and 23d of October, the *Leste* was very severe; the hygrometer, by evaporation, indicating from 20° to 22° of dryness. The first day I was fully exposed to its influence, also to great solar radiation, the black-wooled thermometer indicating 160° of Fahrenheit. I enjoyed it much, and felt no oppressive effects from it. The wind blew very strong, which increased its drying influence on the body. On the 23d I was well up to 10 A. M., but at that hour was seized almost instantaneously with pains at the pit of the stomach, which shot to the back and loins, and towards the region of the kidneys. The abdomen was very tense, with pain on pressure, which also was the case in the urinary region.

The bowels were constipated, and the rectum appeared to be drawn up. The usual quantity of aperient medicine had little or no effect. The sensations, at the commencement of a paroxysm, were of a very peculiar nature, exciting an almost irresistible tendency to laughter, which soon amounted to a sense of the most intolerable pain. I could not remain above a few minutes in one position, most particularly whilst lying on the left side; and the only posture which procured any relief was that which is adapted to the operation for lithotomy, the hands grasping the feet with powerful exertion. I experienced much sickness and nausea, and vomited a considerable quantity of acid matter, while I suffered great thirst with, a perfectly dry skin.

The head, however, was not the least affected, so that, during the intervals of extreme pain, I could have prosecuted any mental pursuit. Whatever was taken into the stomach produced distress. Warm water with a little compound spirits of ammonia was productive of almost immediate vomiting. I afterwards tried twenty minims of the *liquor morphiæ* in water, but without any diminution of the symptoms. At 3 P. M. the hygromer indicated 17° of dryness, and commenced to decrease about 4 P.M. At 6 P. M. it was only 7°, and the following morning was reduced to 2°, or near the point of saturation. The symptoms began to decrease about 4 P. M. when copious perspiration followed; so much so, that two nightshirts were soaked in the space of three hours. At 9 the same evening, I felt perfectly well, but very prostrate, a state which lasted about a week.

Whether to attribute those symptoms to the extreme dryness, along with the influence of great solar radiation, or to some electrical condition of the atmosphere, I do not know.

II.—MEDICAL PATHOLOGY AND THERAPEUTICS

ATELECTASIS PULMONUM; *or Closure of the Air-Cells of the Lungs in Young Children.* By George A. REES, M.D. London, 1850. 8vo. Pp. 453.

The term ATELECTASIS, it has been explained in volume seventy-first of this Journal, means Imperfect Expansion, and, applied to the lungs, is intended to denote that condition of the lungs in which the air-cells are not expanded by air. This, it has been in the same place explained, is a state of the lungs occurring in new-born infants, in connection with certain morbid states of the respiratory organs. But it may take place also as a disease occurring after birth.

Dr Rees, therefore, distinguishes two forms of Atelectasis:—

I. Atelectasis existing as a defect from the hour of birth.

II. Atelectasis occurring as a disease after birth.

The pathognomonic symptom of this disorder is altered movement of the ribs in respiration, which is so characteristic as to enable the observer at once to recognize the nature of the case. Of this the following explanation is given.

In the infant still-born, but slowly recovering from the state of asphyxia, the first symptom of animation consists in a sudden and abrupt contraction of the diaphragm constituting the primary effort at inspiration. The expansion of the lung at that moment, is not in exact relation with the descent of the muscle, nor is extra-uterine life fully established; for pulsation continues in the funis, and does not cease until respiration is more perfect; there is a larger or smaller portion of lungs still in a fœtal condition, in fact, in a state of atelectasis.

Owing to the organs being still partially solid, a very singular circumstance will be noticed, if the thorax of the infant be observed. During the inspiratory effort, the ribs move inwards or backwards, towards the mesial line of the trunk, instead of outwards, as in ordinary respiration, diminishing instead of increasing the transverse diameter of this cavity. As this is the result of unexpanded lung, if respiration become properly established, the lungs being fully expanded, it disappears, sometimes after one or two inspirations; but if the lung remain closed, it will perpetuate the altered movement, and it then becomes the symptom of atelectasis.

It is not difficult to account for this phenomenon. When the diaphragm descends, unless the lung expand at the same time, a vacuum would result if the thoracic walls remained immoveable, or enlarged as in healthy respiration; but the parietes being flexible, especially at this early period of life, yield to the external atmospheric pressure, pass inwards instead of outwards, and the capacity of the cavity continues in relation with the imperfectly expanded lung.

Bearing this in mind, it will be natural to suppose that the same condition of lung supervening as a post-natal disease, especially if occurring while the ribs have as yet the flexibility natural to them, during childhood, will be accompanied with the same altered movement, and this will be found to be the case; it, therefore, becomes the characteristic symptom. It may, indeed, be present in one other class of cases; but then other concomitant symptoms will enable the practitioner to distinguish them; namely, where obstruction of the primary air-tubes prevents a free ingress of air to the lungs, as in croup and laryngitis. It is a symptom, although hitherto almost entirely neglected, of these diseases; but there will be no difficulty with the stridulous, or laryngeal breathing present, to distinguish between these cases and the affection of which we treat. At the same time it will at once render the diagnosis easy between atelectasis and pleurisy, pneumonia, or phthisis, in neither of which diseases, unless associated with the former, do the ribs ever pass inwards.

II. Laryngismus stridulus, in infants the subjects of atelectasis from birth, is a very common symptom, and many are carried off by a sudden spasmodic attack. The imperfect expansion of the lung renders necessary an exact equilibrium between the inspiratory and expiratory effort, and any sudden exertion destroying such balance is followed by closure of the glottis. Dr Rees is not aware of any modification of this affection as a symptom in these cases; the crowing comes on suddenly when the infant is quickly moved or excited, and is generally present at the moment of awaking from sleep. Where the affection comes on after birth he has not observed this symptom.

III. Cough. As the last described symptom is peculiar to atelectasis of the first form, so this is observable only, or chiefly, in cases of the second form, and then it becomes very significant. The mother will often trace the commencement of the attack to a troublesome dry cough, and it is a peculiarly dry, distressing cough;—a barking cough, perhaps, best describes the kind; it continues at times for hours, while at other times considerable intervals may elapse between the attacks; and there is little or no expectoration. It is generally, almost always, worse at night, and though reiterated, wants the spasmodic character of hooping-cough.

IV. Dyspnœa. The degree of dyspnœa present will vary according to the larger or smaller portion of the lungs solidified; but where it is at all marked there will be noticed in it a peculiarity very characteristic, and which he thinks is not met with so decidedly in other cases. The difficulty in respiration seems to show itself first in the rapidity, and secondly in the unequal lengths of the inspiratory and expiratory effort, the former being much the longer. Moreover, owing to the persistance of the difficulty, it becomes habitual to the child, so that you find it cheerful and taking notice when the quickness of breathing is to the observer really distressing and would be taken by any one unconversant with the nature of the case to denote active inflammation; this constitutes the peculiarity adverted to

V. EMACIATION. This, as a symptom in infants suffering from birth, has been mentioned by Professor Joerg, and may proceed in them to the extreme of marasmus. The case of the infant, E. R.,[*] is an instance of this, and he thinks he never opened a more attenuated body. Where the disease comes on afterwards, he has never seen the emaciation proceed to such an extent. In the latter cases it is confined chiefly to the limbs, the abdomen at the same time becoming unduly tumid; for the abdominal muscles, by the altered movement of the ribs already spoken of, lose to a great degree their power of compressing the viscera; their fixed point of action is removed, and hence the intestines, especially the colon, become distended with air, and, together with venous congestion, to be described hereafter, increase the bulk of the containing cavity.[†]

VI. PALPITATION. Increased action of the heart is not met with in the first form of atelectasis, as far as Dr R. has seen, except where the *foramen ovale* continues open; in the second form, where the disease has continued some time, it is very marked both in frequency and force, giving all the indications of enlargement of that organ. Sometimes hæmorrhage from the nose, and more rarely from the rectum, seems to afford temporary relief to this symptom.

VII. CYANOSIS seems to have been present in many of the cases described by Professor Joerg, and, as far as Dr Rees remembers, in every case opened by him where the cœrulean tint was marked, and the *foramen ovale* open, a larger or smaller portion of the lung has been solid, though at times apparently more from congestion and hepatization than atelectasis; at other times the degree of venous congestion, owing to the impediment offered to the return of blood from the systemic circulation, by the altered movement of the ribs, and the imperfect oxygenation consequent upon the decreased aerating surface in the lungs, gives a dusky hue to the skin, especially of the extremities, that is not unlikely to be mistaken for *morbus cœruleus.*

VIII. DEFORMITY OF THE CHEST. Finally, we have in both forms of the affection, if the atelectasis be considerable, and life continue sufficiently long, deformity of the chest resulting as a means of adapting containing to contained parts. The direction of the deformity will depend upon the original constitution of the subject. If a strumous diathesis be present, strumous, or ricketty malformation of the chest will result. The bones themselves will yield beneath the arms, where a hollow will occur, narrowing the cavity in that direction, while the front projects unnaturally forwards. The common form of ricketty chest is, he believes, usually the consequence of atelectasis of the lung; and this explains a difference not otherwise readily accounted for,—namely, why, in one case, with considerable ricketty deformity of the extremities, there is a fully expanded and well-formed chest, while in another, with the limbs straight, the altered shape of the chest is so considerable; it is because in the latter case the lungs have previously become shrunken. Owing to a vitiated atmosphere or other depressing cause, atelectasis of the lungs has taken place, and the walls of the chest are forced inwards to adapt them to the state of the respiratory organs.

But this occurs only in children of a strumous habit: where no such predisposition is present, nature accommodates the parietes of the thorax to the diminished lung in a different and very peculiar manner. The point of contraction then takes place at a little distance on either side of the sternum, at the line of junction between the ribs and their cartilages, a groove more or less deep developing itself there, which produces a channelled appearance on either side of the chest. At the same time, to accommodate surrounding textures, the spine becomes curved forwards by a partial dislocation of one of the lower dorsal vertebræ, thus adjusting the trunk to the diminished capacity of the thorax.

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[*] See Case IV.

[†] This symptom was first pointed out in these cases by Dr Snow.

DIAGNOSIS. In both forms of the affection the previous history will assist the diagnosis. In his own practice certainly half of the cases of the first form have been twins, and universally have been born in a state of asphyxia more or less complete. As before stated, wherever a still-born infant recovers from this state, the altered movement is apparent during the first inspiratory efforts, and disappears as the lung becomes fully expanded. It becomes permanent where this necessary metamorphosis, if the term may be employed, of extra-uterine life is only partially effected.

In tracing the history of the second form of atelectasis, its origin may often be found in a severe attack of bronchitis, which has never left the child, but being succeeded by troublesome cough, slow emaciation, and altered movement of the chest; or it may succeed pneumonia; and any practitioner who has had an extensive experience in the diseases of childhood, will call to mind cases where, the first symptoms having been very active, the physical signs distinct, and in which treatment seems to have arrested the rapid progress of inflammation, nevertheless, at a certain point of the case, the favourable progress has been arrested, and has been succeeded by a slow and progressive emaciation, which has gone on to a fatal termination, and yet without any distinct symptoms of true *phthisis pulmonalis* developing themselves. Many of these cases, on careful examination, will prove to be instances of atelectasis, and be found to present the true characteristics of this affection. In other cases the disease has seemed to be produced by change from an airy into a closer situation; it seems, indeed, emphatically the disease of malaria; and the greater number of cases seen by Dr Rees have appeared to be the consequence of a vitiated atmosphere.

In the first form the prognosis is unfavourable. In all instances, almost, where secondary affections of the lungs take place, the disease terminates fatally. Open *foramen ovale* is a cause, not a consequence, of the disease.

In the second form, the case admits of remedy if attention is given to proper directions. When the child survives the first two years, the ribs gradually become more rigid, and the relation of the frame to the diminished volume of the breathing lung is adjusted. After this the child may grow and thrive, the deformed chest, being a variety of pigeon-breast being the only evidence of former mischief, though a portion of the lung continues condensed.

NECROSCOPIC APPEARANCES.—The emaciation is in general extreme. The portions of the lungs most frequently found affected are the lower lobes and the middle lobe of the right lung, especially the tongue-like process. In one instance, inspected by Dr Rees, the whole of the upper lobe of one lung was affected, the rest of these organs being healthy. The affected portion may be small, only the thin edges of the lungs being in the atelectic state.

The lung affected is found solid, void of air, and not crepitating on pressure. It is flabby, of a dark purple colour, resembling lung subjected to pressure from effusion. It is carnified, compact, sinking in water, and on incision its component tissues are very visible.

An important fact, noticed by Joerg, and repeated by MM. Bailly and Legendre, is, that by inflation, the tissue can be made in a great degree to resume its natural healthy appearance. This is believed to afford a means of distinguishing between Atelectasis and Hepatization. In Atelectasis the tissue is merely closed, and the lung is shrunk and collapsed, as when it is compressed by effused fluid, and being not bound by false membrane, as in pleurisy, air may be again made to penetrate the air-cells, and the tissue may be inflated. In hepatization, the consolidation is the result of interstitial deposit; and by no method of this kind can the lung be again expanded.

In the second form of Atelectasis, the secondary effects are very apparent. The deformed chest and tumid abdomen at once arrest attention; and on laying open the chest, the chief, and in some instances the only, object visible, is the pericardium, containing a much enlarged heart pushing aside the shrunken lungs and concealing them from view. On opening this membranous sac the hypertrophy is observed chiefly confined to the right cavities; the obstruction to the pulmonary circulation causing an increase of the muscular walls on this side, the parietes of the right ventricle descend to a level with the left, and this gives the appearance of a double apexed heart.

But the obstruction is followed by more remote effects. The large venous trunks of the systemic circulation are generally found gorged with blood, and the same state is observed in their tributary streams. The cerebral veins and sinuses are distended, and the bloody points on the brain numerous where no cerebral symptoms have supervened during life. The abdominal viscera present an analogous appearance. The *venæ cavæ hepaticæ* pour forth a quantity of blood on the first incision, the liver is large and of a dark colour, the spleen sometimes much enlarged, and Dr Rees has seen the kidneys much darker than natural from venous congestion.

The lungs themselves are sometimes remarkably shrunken, the parts most frequently solidified being the lower lobes, the upper crepitating freely, and bulging over the solid tissue, that is, the surface of the healthy lung being above the level of that affected. In only one instance, and that owing to surrounding congestion, perhaps a doubtful one, did Dr Rees meet with tubercles. In well-marked cases of atelectasis no tubercular deposit was observable, either in the chest or abdomen.

Treatment. The treatment must be considered separately as regards the two forms.

Treatment of the first form will often prove available at the hour of birth, and much may be done to assist in the establishment of normal respiration,—in other words, the expansion of the lung. The great point will be, to wait some time before dividing the funis, if there be, as there generally is, a continuance of pulsation; by this means an equalization of the systemic and pulmonary circulations will be encouraged, the blood, as yet extraneous to these systems, being returned to the placenta. At the same time, the usual excitants to respiration will prove beneficial, such as exposing the surface of the body, alternating pressure on the chest and abdomen, tickling the feet, &c. After an interval of two or three minutes, the cord may be divided without tying, and some blood allowed to escape. This Dr Rees thinks the most efficacious means in our power, and he has seen it succeed in enabling the infant to breathe more freely, the lung to become inflated, and, in consequence, the altered movement to disappear. The warm bath will be a powerful adjunct to the means just recorded.

Where all endeavours fail, and the lung remains still unexpanded, the after treatment will consist in keeping the infant in an equable temperature; for a remarkable proneness to bronchial inflammation always exists, and any affections of the respiratory organs will tell with double violence upon a subject where the aerating surface is already diminished.

Treatment of the second form consists very much in hygienic measures. Close and unhealthy situations seem to be the great predisposing causes to atelectasis, and removal from such habitations will be the first great indication. Many of these children are offspring of the poor, and live in down-stairs or underground apartments, or it may be, are brought up in a little back shop-parlour, some of which, in London, are, certainly, the most miserable of dwellings; and unless removal from such localities can be effected, all medical aid will be in vain. It may be possible to avert the difficulty, by a slight change to a neighbouring larger street, or to the upper part of the house; but where possible, complete change of air, to a more salubrious and warmer spot, should be enjoined.

The next point to be imperatively insisted on, is to keep the patient always in a recumbent position; and this should be on a firm unyielding surface,—a pillow spread on a board, or a small mattrass, being the best couch. It will require much firmness on the part of the medical attendant to secure this; but the importance of the measure will justify the insisting upon it. This position seems to antagonise, to the small extent we are able, the altered movement, and by keeping the spine supported and extended, renders more tardy the projection of the column, so giving the best chance for the condensed lung again to expand.

To further this object a dry diet will prove useful, so as to diminish the quantity, as far as possible, of the circulating fluid, and avoid unnecessary abdominal distension. The diet must not be poor; for a child of two years old a portion of meat once a day, with bread, and no vegetables, should constitute the chief meal; and a half tea-cup full of weak tea or coffee should be all the fluid taken at tea and breakfast. Fruit and pastry must be strictly prohibited. Where the abdomen is very tumid, the cause being the weakened influence of the abdominal muscles, a bandage, elastic and not too tight, may be applied.

Internal treatment should be administered with a regard to the secondary affections, rather than with the idea of influencing the state of the lung itself. This treatment may be comprehended in few words:—To secure a free action from the skin and kidneys, to relieve the ever-recurring congestion of the hepatic vessels, and as far as possible combine these with the administration of a tonic.

For this purpose, a mixture of saltpetre, wine of ipecacuan, and hyoscyamus, sometimes with a small proportion of Epsom salts, is recommended. For relieving the liver, mild mercurials, or mercury and chalk, with a little aloes, in powder, or, where the mercury is inadmissible, the compound decoction of aloes.

Warmth to the surface by means of flannel covering is indispensable.

Eight cases are subjoined in illustration of the symptoms and morbid changes. One is here inserted.

Case VI.—Elizabeth L——, living in a back room, ground-floor, Long Alley, aged ten months, brought to the dispensary for shortness of breath and cough, presenting the same set of symptoms as already described, without the same degree of collapse, the cough, of a peculiar character, being short, and at times reiterated as in pertussis; the dyspnœa considerable, and the altered movement of the ribs very remarkable. On examination of the chest the ear detects loose bronchial rattle here and there, and over the lower lobes of the left lung small crepitation. The abdomen tumid; bowels confined; tongue coated.

The mother's account is as follows.—The infant was a seven months' child, apparently still-born, but recovered gradually. It has been subject since birth to shortness of breath. The mother always observed the altered movement of the ribs, and when she took it to the hospital, pointed out the circumstance. It came to live at Long Alley six months since, and from that period has gradually declined. About six weeks since, it suddenly became feverish, and more oppressed in its breathing, and the cough then first commenced, being peculiarly harsh, and "causing a blue vein to rise up in the neck."

The treatment in this case, which was very simple, seemed at first to relieve, and the patient revived for a few days; but the improvement was short duration—the dyspnœa and cough prevented the infant's rest, and it sank gradually from exhaustion, after it had been attended about three weeks.

Examination of the body, twelve hours after death.—The body emaciated; abdomen tumid; lower extremities ricketty.

Thorax—On opening the chest, the lungs observed somewhat small, and a large portion of those organs solidified, the solid portions being of a dark purple colour, and soft, flaccid feel; in fact, exactly similar to carnified lung; this carnification extending over a considerable part of the upper and lower lobes of both lungs, especially along the thin marginal edge of the lobes, and the middle lobe of the right lung. On inserting a blow-pipe into the right bronchus, and inflating the corresponding lung through it, the organ becomes pervious to air throughout nearly the whole of its extent, a great portion, previously solid, becoming inflated, losing its purple tinge, and assuming its healthy appearance. The pericardium healthy. The heart of average size; small digitations on tricuspid valves; the remaining valves healthy.

Abdomen—The liver healthy, but large; the *venæ cavæ hepaticæ* turgid; the gall-bladder full; pancreas and spleen natural; the stomach and intestines much distended with flatus; mesenteric glands hypertrophied; the stomach and intestines perfectly healthy.

Head—Bones widely separated, only very partially ossified; the sinuses full; on removing the calvarium some effusion observable beneath arachnoid covering hemispheres; brain soft, numerous bloody points on *centrum ovale*; the remainder of the organ healthy.

In this tract, the name of the disease is erroneously printed, whether from error of the printer or not, it is not easy to say. The name ought to be ATELECTASIS, not Atalektasis. The derivation is from ατελης, *imperfectus*.

Contributions to the Chemical History of the Urine, Part II. *On the Variations in the Alkaline and Earthy Phosphates in Disease.* By HENRY BENCE JONES, M.A., F.R.C. of Physicians. (Philosophical Transactions, Vol. cxxxvii. Art. 21. Received 22d January. Read 2d April 1846.)—Dr Prout long ago remarked that an excess of phosphates in the urine accompanies certain affections of the nervous structure; for instance, softening and other disorders of the spinal chord, and in certain circumstances, softening of the brain No analytical results, however, were stated, and the observations, Mr Jones thinks, referred to the earthy phosphates alone.

Most practical physicians and surgeons have observed that, during the presence of various affections of the brain and spinal chord, the urine was either voided alkaline, or speedily became alkaline. This, indeed, Andral has attempted to explain by ascribing it to the long time during which, in these diseases, the urine is retained within the bladder. The present author undertakes to examine the subject with attention, and to present an accurate account of the results thus obtained. His results, indeed, are mostly negative. He first shows that the earthy phosphates are subject to variations so great, depending on the water, the food, and the medicine taken, that from their estimation no result can be obtained. He then gives the total amount of earthy and alkaline phosphates in diseases, in which the nervous tissues, or their neighbouring tissues, are affected.

The morbid conditions in which Mr Jones has examined the urine are the following:—

1. Diseases of the spine; from injuries, caries, paraplegia.

2. Diseases of the membranes and chronic diseases of the brain.
3. Fractures of the bones of the skull.
4. Acute diseases of the brain.
5. Functional diseases of the brain; as violent delirium and *delirium tremens.*
6. Insane persons.

For the use of comparison, he gives the amount of the earthy and alkaline phosphates in some diseases in which the nervous tissues may be considered as unaffected. These are—

1. Acute diseases; as acute rheumatism, gout, fever.
2. Chronic diseases, as Bright's disease; diseases in which very small quantities of water are secreted; scrofulous diseases, as exostosis, *mollities ossium.*

The author has arranged his results separate in nine tables. The following we give as the conclusions from these tables :—

I. The variations in the earthy phosphates in one case, during ten successive days, appear to follow no rule. In the other cases the amount of earthy phosphates seemed to be about the healthy standard.

The general conclusion was, that the variations in the earthy phosphates were independent of the nature of the disease; and this conclusion is borne out by all the other tables.

II. In fractures of the spine and paraplegia, the total amount of phosphatic salts was slightly above the healthy standard at the early period, when inflammatory action might be present; when chronic, or free from inflammation, the total quantity of phosphatic salts was lower than natural.

III. In chronic diseases of the brain, and in chronic, and even acute diseases of the membranes, there was no increase of phosphates.

IV. In fractures of the bones of the skull, when any inflammation of the brain appeared, there was a slight increase in the total amount of phosphates. When there were no head symptoms, no increase of phosphates was observed, even though other acute inflammations supervened.

V. In acute inflammation of the brain there was an excessive amount of phosphate secreted; when the acute inflammation became chronic, no excess was observable.

VI. In some functional diseases of the brain an excessive amount of phosphates was secreted; this ceased with the delirium. In other functional cases, as in fevers, no excess was observed. *Delirium tremens* showed no excess or deficiency when food could be taken; but in the most violent cases, when no food was taken, the phosphates were diminished in a most remarkable degree. In one case in which, at this period, there was no alkaline phosphate, the urine was acid to test-paper. In another, in which the total quantity of phosphatic salts = ·06 per 1000 urine, there was a strong acid reaction; the urine remained acid for eight days in June.

VII. In the general paralysis of the insane no increase of phosphates was observed. One case of acute paroxysm of mania showed a small increase during the paroxysm. In two other cases of mania there appeared a diminution of phosphates approaching to that in *delirium tremens.*

VIII. Acute inflammations and fevers showed no increase.

IX. Bright's disease, even with acute inflammation, showed no increase. Where only a few ounces of urine were secreted, as in dropsy, there was a slight apparent increase. In scrofulous diseases no increase was observed, nor in a very extreme case of exostosis. In the acute case of *mollities ossium* there was a decided increase in the earthy phosphates, and the alkaline phosphates at last were also in excess, though there was no symptom whatever of affection of the nervous structures.

The general conclusions are:—

1. That acute affections of nervous substance, organic and functional, are the only diseases in which an excess of phosphatic salts appears in the urine. In acute inflammation of the brain, the amount of phosphates seems to be proportional to the intensity of the inflammation. In some states of violent delirium the amount of phosphates may also be proportional to the deilrium.

2. That in a large class of functional diseases of the brain, of which delirium tremens presents the most marked example, the amount of phosphates is most remarkably diminished.

3. That no chronic diseases whatever show any marked excess in the total quantity of phosphatic salts secreted, at least as far as this mode of analysis is conclusive. One case of *mollities ossium* formed the only exception to these rules.

Remarks on the Causes and Morbid Anatomy of Mental Diseases. By John Webster, M.D., F.R.S., &c. (Medico-Chirurgical Transactions, Vol. xxxii., p. 115. London, 1849.)—In the twenty-sixth and twenty-eighth volumes of the Medico-Chirurgical Transactions, Dr Webster published the inspections of 108 instances of insane patients, and deduced from them various important inferences. In the present paper he gives shortly the facts of sixty-seven additional inspections, from which he deduces in like manner several valuable inferences. Dr Webster has also employed the facts furnished by these cases to elucidate the Etiology of Insanity. As these observations are prefixed to the report of inspections, an abstract of them may conveniently precede that of the pathological deductions.

First, among the 1798 curable lunatics received into the above institution, during six years ending the 31st of December last, 1094 were female, and only 704 male patients. These numbers show an excess of 390 individuals, or 55·39 per cent., of the former over the latter sex, and exemplify the greater liability of women than men to attacks of mental disease.

Of the 704 male lunatics now recorded, mental disease was induced by moral causes in nearly one-half the entire number, or 346; whilst of the 1094 female lunatics, the proportion was not quite so large, being 489 individuals, or 44 69 per cent. From such data it appears, that half the cases of insanity arose from moral influences. On the other hand, respecting physical causes, amongst the 704 male lunatics, 156, or 22·15 per cent., originated from that source; whereas amongst the insane females, the proportion was somewhat greater, being 282, or exactly 25·77 per cent.

On investigating more minutely the cases of the 1798 patients, it appears, that amongst the 346 males who became insane from moral causes, the disease in 86 individuals, or 24·85 per cent., originated from reverse of fortune. The next most influential moral cause affecting males was anxiety, of which 69 instances are enumerated, being 19·67 per cent. Religion follows afterwards, and furnished 45 cases, or 13 per cent. Then love, from which mental emotion, 18 examples of insanity are registered, or 5·49 per cent.; and lastly, fright, which gave 13 cases among the male patients attacked by madness.

Contrasted with this summary of moral causes acting upon men, it may be interesting to advert to the 489 insane females classed under the same division. Here anxiety holds the first rank, seeing it produced mania in 79 cases, being at the rate of 16·15 per cent. Then religion, to which 69 instances, or 14·11 per cent., are assigned. Loss of relatives furnished 62 cases, or 12·67 per cent.; whereas, in male patients, only 14 examples of the same description were observed. Love follows next, by which influence 57 females, or 11·65 per cent., were reported to have lost their reason; thus making upwards of double the number, comparatively speaking, of cases of insanity occasioned by this cause upon their more susceptible imaginations, than upon men. Fright produced mania in 50 women. Reverse of fortune in 49, or only 4·51 per cent.; whereas, amongst insane males, the ratio was nearly treble that amount.

In regard to the physical causes producing insanity in men,—of the 156 individuals so affected, 80 originated from intemperance, being upwards of half the total amount of patients belonging to this division; whilst 24 cases, or about one-sixth, arose from previous physical disease, or injuries of the head. Again, amongst the 282 female lunatics whose mental malady was produced by physical causes, the largest proportion became insane from puerperal disease; 117 examples of that complaint being enumerated, or 41·70 per cent. Affections of the uterine organs rank next, and furnished 53 examples, or 18.79 per cent.; whilst, under the head of intemperance, instead of one-half the cases arising from physical causes, being so classed, as in men, not more than 35 instances of insane women arose from the immoderate use of intoxicating liquors, being at the rate of only 12·40 per cent., in place of 51·28 per cent., as in the other sex.

Many other causes, both moral and physical, producing insanity in both sexes, such as domestic unhappiness, intense study, excessive application to business, false accusations, sensual excess, nervous diseases, and so forth, might be detailed; but it is almost superfluous. Dr Webster, however, adverts to two peculiar influences which produced insanity in males; namely, the loss of lawsuits, and political excitement. From the former, 4 male patients became mad, in consequence of the harassing legal proceedings to which they were subjected; while from political excitement, unlike the results lately noticed in France, Italy, and Germany, only four instances have been met with amongst the total curable lunatics admitted, during the last six years, into Bethlehem Hospital.

Hereditary predisposition to mental disease, as it appeared amongst the 1798 insane persons comprised in the present category, is the next point to which Dr Webster directs attention. Nearly one-third of the number, or 609 individuals, were ascertained to have such tendency, the largest proportion being, however, female patients. Thus, amongst the 704 male lunatics admitted, only 219, or 31·10 per cent., were hereditarily predisposed; whereas, of the 1094 female lunatics, 390, or 37·47 per cent., were of that description. This feature becomes more interesting, when it is remembered, that insanity is a disease more frequently transmitted to offspring by the mother than by the father; whilst mothers also transmit this disease oftener to their female than male children.

Respecting the curability of insanity, Dr Webster remarks that in male lunatics, the mental disease, *cæteris paribus*, proved more curable where the attack was produced by pecuniary embarrassments than it did when originating from any other moral cause; and next where the malady arose from religion. But amongst female lunatics, the cases in which love was the assigned cause, occupied the first rank in the ratio of curability; and these were followed by the cases due to religion. Again, with reference to physical causes producing mania, the attack seemed most curable when it arose from intemperance, in male insane patients; but in females, a more favourable prognosis might be predicted in cases of puerperal insanity, than in almost any other variety of mental alienation.

In regard to the period of life when mental disease supervened, amongst the 704 male lunatics referred to, the largest proportion became insane between the ages of 30 and 40; the number at that period of life being 218, or 30·96 per cent. But, in females, the attacks occurred earlier; 309 of the 1094, or 28·24 per cent., being from 20 to 30 years of age. With reference to the civil condition of patients, more married persons were affected by insanity than single, particularly males; whilst a larger proportion of widows were attacked than widowers; the single of both sexes being nearly equal, as is shown in the following table:—

Civil Condition of the Curable Lunatic Patients admitted into Bethlehem Hospital.

	MALES.	FEMALES.
Married . .	375 or 53·26 per cent. ...	543 or 49·63 per cent.
Single . . .	304 or 43·18 per cent. . .	464 or 42·61 per cent.
Widowed . .	25 or 3.55 per cent. ...	87 or 7·95 per cent.
Total . .	704	1094

In 53 cases, effusion of water had taken place in the ventricles; in 53, also, infiltration of the *pia mater;* in 38, turgidity of the blood-vessels of the brain and membranes; in 30, the arachnoid membrane was thickened and opaque; in 26, the colour of the medullary substance was changed from its natural tint to a claret, red, yellow, brown, reddish-brown, pink, white, or pale tinge; in 18, the brain appeared shrunk, flattened, or swollen; in 15, effusion of blood was noticed within the cranium; in 12, the texture of the brain was altered from its normal consistence to greater firmness, or a softer condition than natural; in 13, bloody points were numerous on the cut surfaces of the medullary substance; in 11, water was effused in the base of the skull, after the brain had been removed. In addition to the diseased appearances now enumerated, other morbid alterations of structure were also noticed in particular patients; such as effusion of purulent matter within the cranium, of which four examples are recorded in the cases now reported, besides various individual changes in the cranial contents different from their normal condition. As it would be superfluous, however, to enumerate the morbid appearances already mentioned, reference should be made to the several cases reported in the above synopsis, in order to ascertain the different forms and varieties.

Notwithstanding the marked diseased alterations frequently observed in the organs of the chest in the lunatics examined pathologically,—indeed, nearly the entire number of autopsies now reported exhibited more or less of disease in the contents of that cavity,—yet almost half likewise showed morbid changes of structure in the organs of the abdomen. Of the 62 having diseased alterations in the chest, 48 manifested recent or old adhesions; in 25, tubercles existed; in 23, suppuration had actually commenced; in 23, the lungs were consolidated; in 17, lymph was effused into the pleura; in 8, inflammation of the lungs or pleura had supervened; in 7, the colour of the lungs appeared altered; whilst in 17 cases the heart was found to be diseased in its structure.

Respecting the morbid changes met with in the abdominal viscera of the 30 cases above mentioned, it seems unnecessary further to allude to the morbid phenomena observed than to state, that in 13 of the patients the liver was diseased; in 8, there appeared decided marks of intestinal inflammation; and in 6, tuberculous deposits were noticed in various structures; in 5 cases, effusion of lymph, and in 2, of pus, had taken place; in 4, there was alteration or mortification of the intestines; and lastly, in 2 patients the kidneys were diseased.

From the decided and serious character of the morbid alterations of structure met with in the various dissections reported in this communication, it will be at once perceived that the deaths of many of the lunatics evidently arose in consequence of physical disease, especially in the organs of respiration, and also from recent affections of the brain, wholly irrespective of the patient's mental malady. In illustration of the above interesting feature respecting the apparently immediate cause of death, in many of the lunatics treated at Bethlehem Hospital, it may be instructive to mention, that of the 136 persons who have died in that establishment during the last six years, including all classes of insane patients, whether in the curable, incurable, or criminal departments, 28, or 20·58 per cent., of the deaths actually arose from pulmonary consumption, whilst 16, or 11·76 per cent., were produced by apoplexy. Disease of the heart occasioned death in 8 individuals; in several, dropsy was the cause; gangrene of the lungs in others, as also ulcerations of the intestines; besides various other diseased alterations of structure in the abdominal viscera, the organs of the chest and the brain; similar to those by which patients, not insane, often fall victims. In fact, many of the 136 individuals now mentioned, died from organic affections, analogous to the maladies usually observed in ordinary medical practice.

Another point of some interest seems worthy of a passing remark, seeing it is illustrated by several of the cases contained in the above synopsis of dissections; namely, the long period of time during which some of the patients continued insane. For instance, No. 50, a female, was 29 years a lunatic. Another female, No. 61, was 29 years and 8 months mad; and another female, No. 2, was 42 years in the same condition. But the most remarkable instance of long-continued lunacy, without any intermission, is that of No. 47, likewise a female, who had been an inmate of Bethlehem Hospital for not less than 54 consecutive years. This unfortunate and afflicted human being, deprived of reason, shut out from all worldly enjoyment by her continuous residence in the same lunatic asylum for upwards of half a century, and having farther a weak physical constitution, nevertheless attained an advanced age; thus showing how long insanity may continue, even when occasioned by marked physical disease in the head; as in this instance, where the brain was found shrunk and atrophied; cerebral substance pale and firm; lateral ventricles filled with fluid, and yellow deposits in the coats of the carotids; besides several rough or sharp bony prominences within the cranium. Nevertheless, this patient, so long insane, and whose case seems sufficiently interesting to be again alluded to in detail, instead of being ultimately carried off by any recent bodily disease, actually died from syncope, according to the report of her attending physician. Amongst male lunatics, fewer instances of long-continued insanity are recorded than amongst the female lunatics. However, two men, Nos. 36 and 41, had been so afflicted, in both instances, upwards of 30 years; whilst another male lunatic, No. 4, had for 42 years continuously resided in the asylum. These cases at least prove that male, but especially female, lunatics may live for a long period, notwithstanding the existence of their incurable mental malady.

The following may be given as an epitome of the principal diseased alterations of structure met with in the one hundred and seventy-five autopsies, now or heretofore recorded. In 145 cases, the *pia mater* was infiltrated. In 127, there was turgidity of the blood-vessels. In 120, fluid was effused in the ventricles. In 62, the arachnoid coat was thickened and opaque. In 45, the colour of the brain was altered from its natural tint. In 32, bloody points were noticed on the cut surfaces of the medullary substance; and in 32 cases, blood was found effused within the cranium; besides various other morbid alterations of structure already enumerated. From these data it therefore unequivocally appears, that the diseased changes which pathologists may generally expect to find on examining the heads of lunatics, in a great majority of dissections, will be,—1st, infiltration of the *pia mater*; 2d, turgidity of the blood-vessels of the brain and membranes; and, 3dly, effusion of fluid in the ventricles.

Upon the employment of local applications of Alcoholic Tincture of Iodine in the Treatment of Chronic Articular Rheumatism. Essay on Chronic Articular Rheumatism. By Dr L. J. Gros. Thesis Strasbourg, 1848.

Under the name of chronic articular rheumatism, Dr Gros describes a chronic inflammation of one or more joints succeeding acute inflammatory rheumatism, or taking place spontaneously and primarily under the influence of atmospheric causes. It is distinguished by pains more or less intense, more or less constraint in the movement of the joint or joints, by being not attended with any febrile symptoms, recognising no specific cause, and capable of producing various serious lesions in the articular tissues, known by the names of *hydarthrosis*, white swelling, ankylosis, according to the most prominent symptom which they present.

The author enumerates four degrees of chronic articular rheumatism.

1. *Slight rheumatism;* in which there may be no anatomical lesions, or, where these are present, they are limited to the following characters; congestion of the synovial membrane, redness tending to brown colour; effusion more or less considerable of serum not coagulable, and which is easily absorbed; slight change in the cartilages, which are yellowish and softened; no external signs; constraint in movements inconsiderable; pains more or less intense.

2. *Rheumatism with hydarthrosis;* the same characters; inconsiderable effusion of limpid serum similar to the fluid of hydrocele, but holding suspended albuminous flakes; very marked swelling, fluctuation; movements practicable, but attended with pain. The cartilages may be unaffected or may present with the characters above specified, ulcerations more or less manifest.

3. *Rheumatism; with formation of plastic lymph.* The walls of the synovial membrane are lined by tissues of new organisable formation; bridles and adhesions are formed; the surrounding soft parts partake in the disease; swelling is distinct, and false ankylosis take place; the hard parts may be unaffected; in other instances they are hypertrophied; movements are difficult or impracticable by the presence of pseudo-membranous bridles.

4. *Rheumatism with degeneration of the tissues.* In this the formation of plastic lymph, instead of following the normal progress, is arrested or receives a new direction; purulent matter is formed; fungous, bleeding, soft pale granulations appear; the hard parts are more or less affected; the cartilages destroyed or ulcerated, the bony extremities are hypertrophied; the ligaments, tendons, and other fibrous tissues are softened or degenerated, forming an appearance like that of white swelling. The bones lose their normal relations, and spontaneous luxations ensue; the lesions may advance from the inside of the joints to the exterior, and produce openings in the integuments, forming articular sinuses. In favourable cases, the corresponding bony surfaces are united and become ankylosed. In this form of rheumatism, spontaneous movements are most frequently impracticable; movements communicated to them sometimes may cause them to be moved, sometimes not; pains are intense.

The author considers various means of treatment, and assigns most value to that by means of iodine. This remedy, it is well known, is not new. It has been recommended by Sir Benjamin Brodie, Dr Todd, and many others, and is in almost daily use in this country for various articular disorders, whether rheumatic or from other causes, but especially where the disorder is not acute, where it has come on gradually and continued some time, and where it assumes the subacute and chronic character. Dr Todd especially recommended, in 1843,* the iodine paint in cases of chronic, capsular, and synovial rheumatism.

Dr Gros gives the following examples to show that iodine in the form of alcoholic tincture in simple applications is a valuable remedy in all the stages of chronic rheumatism, as soon as alteration in the tissues is taking place.

Case I.—A farrier of the head-staff of Lancers, twenty-eight years of age, of robust constitution, but with a slight tendency to the lymphatic temperament, was attacked some years ago, while he was in garrison at Paris, with acute articular rheumatism, which proceeded to the chronic state, and got well only very slowly under the use of iodide of potassium internally, vapour baths, and temporary blisters (*vesicatoires volants*) over all the diseased articulations. Of these applications he had seven at one time. In the course of this disorder he was attacked several times with a urethral discharge, which was quite ephemeral, and disappeared in a few days without particular treatment. At the end of about one year, the patient returned to duty, which he continued without interruption to the month of November 1846.

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* Practical Remarks on Gout, Rheumatic Fever, and Chronic Rheumatism of the Joints. By R. B. Todd. London, 1843; and Edinburgh Medical and Surgical Journal, Volume LXI., p. 154, 1844.

In the course of the winter of 1846, 1847, the patient experienced, at several intervals, pains in the joints of the knees, the hips, and the feet. These pains, which were attended with a little swelling of the articulations of the feet, were not at first persistent, and, excepting with interruptions of short duration, the patient continued his duties to the month of May 1847. In the course of this month, when in garrison at Nancy, he was sent on staff duty into a neighbouring locality, and performed that day a journey of twelve leagues on horseback. Under the influence of this fatigue, the articular pains of the lower extremities returned next day; they were accompanied with swelling, fever, and a slight urethral discharge, which disappeared spontaneously at the end of a few days.

Having been received into hospital at Nancy, the patient was treated there without advantage, by local blood-lettings, cataplasms, and narcotic applications. The rheumatism, far from undergoing amendment, very soon attacked the hip-joints, and the articulations of the superior extremities. Towards the month of July 1847, before the acute state was entirely dispersed, the patient was sent to the waters of Bourbonne, where he remained for three weeks. Under the stimulating influence of the waters, the condition of the patient became worse; the articular swelling and stiffness increased, and the fever became more intense. At length, during the concluding days of his abode at Bourbonne, M. K. was attacked with a fit of congestion of blood, against which general blood-lettings were employed with success. The patient, following the advice of the physician at the springs, repaired to his family at Strasbourg, in order to spend there the residue of the time of his leave of convalescence.

At his arrival, in the beginning of the month of August 1847, the patient was in the most afflicting condition. The left knee-joint was the seat of a considerable effusion (*hydarthrosis*), the right knee was much enlarged, in consequence of swelling of the articular extremities of the bones and their cartilages, and swelling of the fibrous parts surrounding the articulation. The patient walked without crutches, without great pain. The urethral discharge returned, but, like the preceding ones, disappeared spontaneously at the end of eight days, without particular treatment.

Local blood-lettings were employed over the most painful parts, and pills of corrosive sublimate were given internally.

On the 5th of October, laxative medicines were administered. The external treatment consisted of friction with antimonial ointment on the tibio-tarsal and scapulo-humeral articulations; applications of iodine tincture on the wrists; and on the knees temporary blisters were applied at different intervals. At this time there was felt, on handling the knees, the wrists, and the shoulders, and on moving the members, a peculiar crackling or friction sound, denoting probably lesion of the articular cartilages. This mixed treatment was followed by remarkable general improvement. The wrists were almost in the normal state; the patient could move his fingers and write; the left scapulo-humeral articulation continued in a very painful condition, and the arm was immovable.

Towards the 10th of November, a relapse with fever took place, but less intense than the first one; the urethral discharge returned. Antiphlogistic and purgative remedies were again prescribed, after them iodide of potassium and applications of iodine tincture.

On the 2d of January 1848, the wine of the seeds of meadow-saffron was employed, but after twelve days had to be abandoned in consequence of hypercatharsis and vomiting. The swelling of the articulations had disappeared; the knees, the right shoulder, the wrists, were neither swelled nor painful; the contraction of the toes continued, as well as the immobility of the left arm. The iodine applications were continued, with the addition of saline baths.

On the 15th of February the tibio-tarsal and coxo-femoral articulations of both sides were very painful; the toes were retracted when forcibly extended. The state of the superior extremities was not better. The movements of the right scapulo-humeral articulation was altogether impracticable; the wrists presented a combination of hydarthrosis and of fibrous articular swelling; the elbows were sufficiently well. In the left arm the patient felt sensations of formication, which he attributed to the slight apoplectic attack which had followed the employment of the waters. Locomotion could not be performed without crutches; the slightest movement of a limb, in part or entirely, caused very acute and lasting pains. The urine had a deep red tint, but deposited no sediment. Sleep was bad, and febrile excitement took place towards evening. The patient was subjected to the employment of cupping and scarification, and of purgatives every second day (1.5 gramme=23 grains of calomel daily, in 6 doses). Under the influence of this treatment, the pains, as well as the fever, speedily disappeared, but the anatomical lesions of the articulations continued.

On the 20th of August were commenced the applications of tincture of iodine upon the tibio-tarsal articulations, and upon both knee-joints. Then it was applied daily upon a new joint, until all were thus subjected to the action of the medicine. Internally iodide of potassium was prescribed in doses of half a grain at first, and afterwards increasing it daily to three grains. The amendment of the swelling was speedy, and appeared first upon those articulations which had been first subjected to the action of the iodine. The hydarthrosis of the left knee was quickly dispersed, and towards the 16th of September 1847, the articulation had recovered its normal size and figure; the joints were free from pain; walking caused no pain in the sole of the foot; the grating sounds no longer continued in the articulations of the toes, the retraction of which had disappeared. The movements were still accompanied with stiffness, which disappeared under the use of champooing. The cure was complete.

Case II.—In a man aged twenty-five years, a first attack of rheumatism had left a considerable swelling of the right knee, without *hydarthrosis*, which did not, however, prevent him from attending to his occupation. In the summer of 1846, this man contracted a new rheumatic attack, which subsided in the course of three weeks, leaving after it, however, acute pains, with swelling in the joints of the knees and ankles. The patient was unable to walk, and movements active and passive caused much pain. Iodide of potassium was administered internally, and tincture of iodine was applied over the four diseased joints. After fifteen days of this treatment, all articular pain had ceased. The articulations had recovered their natural size, even the right knee which was swelled before the attack. There was left a little constraint in movement, which disappeared under the use of champooing.

Case III. A carpenter, aged twenty-three years, having entered the hospital for an acute articular rheumatism, was treated there by means of antiphlogistic local applications, leeches applied to the pained parts, and the internal exhibition of the antimonial solution. The rheumatism appeared to be confined to the right elbow joint. Upon this articulation fifteen blisters were successively applied, without obtaining any other than a small degree of relief. Twenty-two days of the application of tincture of iodine removed the swelling of the fibrous parts. At this period the movements of the member were practicable, excepting that of supination, which was imperfect. No pain was felt during movement.

Case IV. A farm servant, aged 40 years, who had suffered at several times, in his youth, muscular and articular rheumatic attacks, and in whom an acute attack passed to the chronic state, was treated for nearly two years by all possible remedies, both internally and externally. On the 15th of November 1847, applications of tincture of iodine were commenced. At this time there was considerable swelling of the right knee, and of the left tibio-tarsal articulation, with acute pain; the right tibio-tarsal articulation was less swelled and less painful; there was acute pain in the right shoulder without swelling; smart pain and considerable swelling of the left wrist; grating and friction rather rough in the movements of the articulations, especially in those of the left knee; indolent swelling of the metacarpal extremities, of the first phalanges of the index and middle finger of both hands; and walking was difficult without crutches, and productive of acute pains.

The treatment was continued from the 10th of November 1847 to the 20th March 1848, and was interrupted only in consequence of an intercurrent attack of pnuemonia. After these four months of treatment, no pain remained in any part. The knee was free in motion, and natural in volume. The swelling of the left wrist had subsided; the tibio-tarsal articulations, as well as those of the fingers of both hands, returned to their natural size. Nevertheless, considerable constraint in the movements remained; the patient walked without pain, but with some difficulty, and with the support of a staff.

By the preceding instances, it is seen that applications of tincture of iodine act in two modes. They abate pains, and they facilitate resolution of chronic articular swellings.

The mode of application of tincture of iodine is very simple. The author of the essay recommends that of the pharmacopœia of Strasbourg, which contains one part of iodine in ten parts of alcohol, at 33°. Between this tincture and that of the pharmacopœia of Paris, there is no great difference. A long compress, soaked in this tincture, is applied around the diseased articulation, and then fixed by a few turns of a roller or bandage. The dressing should in general be renewed every morning and evening. Nevertheless, in persons with fine and delicate skins, or when vesications are produced, which is not often, the applications may be removed, or the tincture may be diluted with more or less water. This precaution is farther useful when the skin is broken, or the cuticle is abraded, or when after having removed the first epidermal scales, formed by the contact of the iodine, the skin below is very sensible and very thin. It is without example, the author says, to see these applications induce active inflammation of the skin. At most they cause pricking and itching sensations, slight heat, and a feeling of tension in the parts subjected to the action of the tincture.

Though it is not our intention to question the therapeutic effects of tincture of iodine in articular swellings and rheumatic affections of the joints, yet it may be doubted whether the first detailed case is a good example of the efficacy of that agent. So many different remedies and modes of treatment were employed, that it is manifest that the iodine applications, whatever may have been their effect, cannot be allowed to have alone cured the disease under which the patient was labouring. Not only were local depletion and counter-irritating remedies employed almost throughout, but the patient took meadow-saffron wine for twelve days, with the effect, it is stated, of causing the disappearance of the articular swellings, immediately after that drug had induced vomiting and purging. At a subsequent period, depletion by cupping and scarifying was employed, and calomel was given in purgative doses. Now, surely all this general and local treatment is not to be regarded as without effect; and it is admitted on all hands, that meadow-saffron and calomel, by acting on the liver and kidneys, are powerful antirheumatic agents. Then it ought to be borne in mind, that though these remedies do not in all instances produce immediately curative effects, yet, after some little time, their curative effects begin to appear. There is strong reason to believe, that in this case, both these remedies, and the internal use of iodide of potassium, as well as the other local treatment, created very considerable effects; and under all circumstances, it is impossible to ascribe the recovery of the patient to the iodine applications exclusively.

With regard to the preparation employed, it may be requisite to remind the reader, that in this country there are two formulae for the preparation of tincture of iodine, besides that commonly called the Iodine Paint. The Edinburgh Pharmacopœia directs two ounces and a half of iodine to be dissolved in two pints or forty fluid ounces of rectified spirit. Two ounces and a half of iodine are twenty drachms; consequently each ounce of tincture contains half a drachm or thirty grains of iodine. In the Dublin Pharmacopœia two scruples or forty grains are contained in each ounce of spirit. In the London Pharmacopœia the tincture is ordered to be made by dissolving one ounce of iodine, and two ounces of iodide of potassium, in two pints or forty fluid ounces of rectified spirit. Consequently each ounce of tincture, contains only twelve grains of iodine, but twenty-four grains of iodide of potassium.

The Edinburgh tincture has one part of iodine to sixteen of spirit; the Dublin, one part of iodine to twelve of spirit; and the London, one part of iodine to forty of spirit, with, however, two parts of iodide of potassium. All of these preparations, therefore, are feebler than the one used at Strasbourg. The iodine paint, again, is stronger. This consists of one drachm of iodine to one ounce of proof spirit; that is, one part of iodine in eight parts of spirit.

It may be convenient to exhibit at one view the proportions of iodine in each form of preparation.

Grains of Iodine in One Ounce of Spirit.

Edinburgh Ph....	30 grains in 1 ounce.
Dublin Ph.	40 grains in 1 ounce.
London Ph.	12 grains in 1 ounce.
Strasbourg Ph....	48 grains in 1 ounce.
Iodine Paint	60 grains in 1 ounce.

We have used, as external applications, for the treatment of diseased joints and other disorders, both the common tincture and the iodine paint. In a large proportion of cases, and with skins of the ordinary degree of excitability, we find the common tincture produces sufficiently well-marked and powerful physiological effects. In the course of from three to five hours after application, it is followed by redness, and itching of the skin exactly similar to urticaria; except that it is continuous, not in patches, and patients generally feel relief only by exposing the part freely to the air, and rubbing it gently with a towel. This erythematous redness is attended with diffuse swelling of the skin, which, with the redness verging at length to faint brown, continues for about two days. In the skins of working people, these effects are not so well-marked; and a stronger solution, as the iodine paint, is necessary to produce the effect. These effects may be maintained in almost any degree of energy by repeated and frequent application of the tincture, and they may in like manner be modified and restrained by suspending the use of the remedy for one or two days. Daily application, or application every evening, is most convenient in the majority of instances. The cuticle desquamates in ordinary circumstances, but rarely any other inconvenience follows.

The swelling of the skin is generally attended, in the case of the joints, with considerable tension, and often there seems to be an increase in the stiffness and immobility of the joint. This may proceed increasing as the iodine is used, for weeks; but at length, if it is to be useful, the swelling subsides, and the tension abates, and with it the pain and other symptoms of articular disease are also abated.

Iodine, nevertheless, does not in all instances produce the beneficial effects often ascribed to it. The physiological effects, as now described, are produced; but it by no means follows that therapeutic effects are to take place. They are most likely to take place where the heat and swelling of the joint, whether from rheumatism or other causes, have been previously diminished and removed by local depletion and the due use of general remedies. They are also more likely to take place after the previous use of blisters than without this preliminary. It is on this account that an opinion may be justly entertained, that in several of the cases given by Dr Gros, the beneficial result was in as great a degree attributable to the previous use of blisters, as to the subsequent employment of iodine.

III.—MATERIA MEDICA.

On the Theropeutical employment of Preparations of Manganese, either as an Adjuvant, or Substitute for Preparations of Iron. By M. Hannon, and M. Petrequin. (Gazette Medicale de Paris, Septembre 1849. Archives Generales, Janvier 1850, p. 98.)—Preparations of Manganese have been hitherto very little employed in medicine. Some experimental trials by Dr Jacques are quoted, tending to show all the anti-epileptic powers of this mineral. The experiments of Brera of Padua are adduced upon the efficacy of the oxide of manganese against atonic diarrhœa; and some observations of M. Gendrin are referred to upon the employment of the peroxide of manganese as a substitute for iron. To these facts it may be added, that Dr Ure proposed the use of the sulphate of manganese in the treatment of gout; that, in a formulary published at Leipsic, in 1847, under the name of *Vade Mecum Clinicum,* by Dr Kovasy, are found formulæ relative to the employment of manganese in chlorosis and in amenorrhœa; and finally, from the examination of the mineral waters of Cransac by M. Doctor Ducoux, a water, the efficacy of which is well known in anæmic diseases, chlorosis, and similar maladies,—it results that these waters contain a sufficiently strong preparation of sulphate of manganese and sulphate of iron.

The preparations of manganese, nevertheless, were scarcely used, when, in 1847, M. Hannon, physician at Brussels, proceeding upon the fact, that iron and manganese are intimately united in nature, and that iron does not in all instances cure chlorosis and anæmia, thought that the blood must contain manganese, and that the inadequacy of iron to the cure depends on the diminution of another metal in the blood. The existence of manganese in the blood has been since established by M. Millon, in a memoir which he presented to the Academy of Sciences. This, however, is not truly the question. It is of little moment whether manganese exists or does not exist in the blood. What is requisite to be proved is, that its diminution causes peculiar symptoms; and what is further required to be proved is, that manganese is, as M. Hannon represents, a specific almost infallible against anæmic disorders, whatever be their origin. It is by multiplied and complex observations that the correction of such a statement can be established, and not by the eight cases attached to the memoir of M. Hannon, most of which are too imperfect to be allowed to be conclusive, and not one of which is not exposed to objections.

M. Doctor Petrequin has made several experimental trials with this medicine. According to this author, there are certain forms of chlorosis which obstinately resist the chalybeate treatment. Iron appears in these instances to have lost its specific virtues, so much commended in such circumstances; and it no more cures them than it cures symptoms of anæmia which are connected with cancerous affections and various organic degenerations.

There is a second order of chlorotic disorders, which, after having derived from chalybeate preparations an advantageous modification, are stopped in the progress which they are making towards recovery, and remain stationary. In the midst of their amendment, the iron appears to have exhausted all action upon them, and possesses no power to complete the cure to which it had given a beginning.

A third order of chlorotic disorders observe a course entirely different. They yield more or less speedily to the ferruginous treatment, and terminate by gradually disappearing; but this is only for a time. The cure is only apparent, and the disease returns at a period more or less distant from the period which was regarded as a sufficient confirmation of the cure.

It is therefore as a substitute for iron, and in order to fill up as it were the defects left by the ferruginous treatment in the management of chlorosis—defects, it is to be added, which have never been observed by other practitioners—that M. Petrequin has had recourse to preparations of manganese. M. Petrequin, it must be admitted, has rather removed than accelerated the solution of the question; for, among the four cases given by him, there is only one in which he has made use of the subcarbonate of manganese alone; in the other three, he employed at the same time manganese and iron. The only example of treatment by manganese alone is an instance, not of chlorosis, but of skirrhus of the orbit with chlorosis. The author, indeed, mentions, in the title of this case, that the iron did not succeed; but, in the history of the case, this is not stated; so that, to determine the point, there are only three complex facts and an inconclusive fact. In other respects, we do not deny the efficacy of preparations of manganese in the treatment of anæmia and chlorosis. What is wanted, however, is, that facts be sufficient in number and conclusiveness.

The pills of subcarbonate of manganese, and the pills of ferro-manganese, employed by M. Petrequin, are composed in the following manner. For pills of subcarbonate of manganese, 100 grammes of purified protosulphate of manganese are dissolved in 500 grammes of distilled water slightly sugared, and 115 grammes of crystallized subcarbonate of soda are in like manner dissolved in 500 grammes of distilled water also sugared. Double decomposition is effected in a vessel stoppered with emery. The mixture is left to be precipitated; the precipitate, after decantation, is washed several times, allowing it to rest each time. Then there are added to the precipitate fifty grammes of honey. The mixture is evaporated as speedily as possible to the consistence of a pill mass, and it is then divided into pills of twenty centigrammes each. The addition of a small quantity of gum arabic produces an advantageous effect; because, by hardening the pills, it preserves them from contact with the air and from peroxidation.

For the ferro-manganesic pills, sulphate of iron, eight grammes; purified sulphate of manganese, two grammes; purified subcarbonate of soda, ten grammes, are taken and beaten together into a mass; a little honey and gum arabic being added; and the mass is divided into eighty pills, two of which are to be given daily before a meal.

It may be proper to mention that one gramme is equivalent to about 15½ grains, English troy, or, in exact numbers, 15·434 grains troy. Consequently, 100 grammes, = 1543·4 grains.
115 „ = 1774·91 „
500 „ = 7717·0 „
8 „ = 123·472 „
10 „ = 154·34 „

IV.—SURGERY.

On the employment of Sugar of Lead in the treatment of certain forms of Ophthalmy, according to the method of M. Buys. By Dr F. Cunier. (Gazette Medicale de Paris, July 1849. Archives Generales, February 1850. P. 219).—The constantly increasing prevalence of ophthalmia, called military or contagious among the poor and working-classes of Belgium, and its obstinate continuance in the army of Belgium, have given birth to numerous works on the treatment to be employed against this distemper. Ophthalmologists have trusted chiefly in late years to the employment of cauterization by means of moulded nitrate of silver. This last method, however, though very efficacious, has certain inconveniences. In the first place, it can only be employed by a surgeon well acquainted with the pathological conditions to which cauterization is applicable, and whose hand has been perfectly practised in this operation. Secondly, this cauterization is most painful. Comparative experiments have been recently made on the large scale at the Depot of ophthalmic patients at Namur, between the method of M. Hairion, which consists in applying solution of nitrate of silver by the aid of a hair pencil,—and that of M. Buys, which consists in depositing by the aid of a little spatula, or, still better, by means of pencil, a layer of neutral acetate of lead reduced to an impalpable powder. The result has been not doubtful. The patients treated by the method of M. Buys have been speedily cured. It has not been so with those treated by the solution of nitrate of silver.

The method of M. Buys consists in this. He selects neutral acetate of lead previously tried and reduced to an impalpable powder; a minute hair pencil, of the size of those ordinarily used for caustic liquids, is moistened with water, in order to be capable of being charged with the lead powder; as one grain or one grain and a half of acetate of lead is necessary to cover the whole inner surface of one eyelid. If it be wished to touch the lower eyelid, the operator requests the patient to look up, and an assistant depresses the under eyelid, as is done in the instance of the application of nitrate of silver solution. The acetate of lead with which the pencil is charged is then uniformly extended over the whole conjunctival surface. This being accomplished, the eyelid is kept reverted until the tears have dissolved the acetate of lead. If any portion of this salt be in excess, it is removed by the pencil.

In order to apply the acetate of lead to the upper eyelid, the eyelid is reverted exactly as in applying nitrate of silver, and the conjunctival portion is in like manner covered with the salt. Solution here takes place more slowly. The moisture furnished by the mucous membrane is most usually insufficient, and the operator is obliged to touch it with the pencil soaked in the tears which accumulate at the angles of the eyelids. As soon as the acetate of lead is dissolved by the tears, and has penetrated into this tissue, it is observed to become crisped and to contract itself strongly; often even a sort of bloody efflorescence ensues, especially in the upper eyelid. But the most remarkable phenomenon is, that the granulations, if they are only of moderate size, and their furrows when present, disappear. The membrane appears smooth and uniform, so long as it remains stretched and exposed to the air. The brilliant white aspect which the lead communicates to it, is in general manifested only after the eyelid is replaced. When the granulations are of considerable size, and the conjunctiva is traversed by deep furrows, the smoothness does not take place upon the first application; but it has been observed to take place after the second or the third.

The contact of the sugar of lead with the palpebral mucous membrane causes a well-marked sensation of constriction and scorching. Actual pain is seldom produced. This sensation very soon disappears, but returns the moment the eyelid touched is restored to its situation. Then comes a flow of white scalding tears, which ceases in a space of time varying from some seconds to two or three minutes; it is seldom more prolonged. The eye may then be held open. If it be the upper eyelid that has been touched in this manner, the sensation of sand, permanent or returning at intervals, which is caused by the rough surface of the mucous membrane, has disappeared; the patient feels only stiffening in the part; and for the space of one or two hours some hot tears flow at intervals. When the lower eyelid has been touched, the sense of constriction remains well-marked for some hours; the sensation of stiffening is more intense, more lasting, and is accompanied at intervals with the return of the scorching felt at the moment of application. On the side of the eye there is no reaction. If there be indolent granulations, the slight injection of the ophthalmic conjunctiva which ensues immediately subsides. If, on the contrary, the conjunctiva is injected, if there is vascularity of the cornea, a very manifest diminution in the calibre and number of the vessels may be ascertained in the course of some hours.

The first application is always followed by the development of a certain degree of swelling, and in some instances of œdema of the eyelids. After twenty-four or forty-eight hours, all this is gone. The application of compresses dipped in camphorated Goulard water, and, still better, the use of dry compresses rubbed with camphor, accelerate considerably the resolution of this state. To these means the practitioner may have recourse when the application of the saturnine salt is following by too lasting and too acute a sensation of scorching or of pain.

M. Buys begins in general with the granulations of the upper eyelid. Sometimes he touches only one eyelid on the same day. Two or three days subsequently he touches the lower eyelids. After two or three days of rest he searches for altered portions of the conjunctiva which may have escaped the application, and these he touches immediately. It is requisite to have recourse to a fresh application when the effects of the first have disappeared, or at least have undergone considerable diminution. This disappearance is so much more speedy as the affection is more acute, or the flow of tears is more abundant. The saturnine salt takes sometimes a considerable time in being detached. This slowness of disappearance of the acetate of lead has led M. Buys to consider the question, namely, to ascertain at what period the granular affection is entirely cured, and by what sign this complete cure may be recognised. After a certain time, says M. Buys, the white aspect of the mucous membrane is no longer homogeneous, in consequence of the progressive elimination of the salt with which it has been saturated, only some diffused trains presenting here and there a species of powdery sprinkling. At the points at which elimination has been complete, the observer may estimate perfectly the integrity of the conjunctiva restored to its normal condition, and by analogy he may infer the cure to be complete, which will be objectively capable of estimation only after the total disappearance of the saturnine salt. If, then, during a time of reasonable length,—one month or six weeks, for instance,—the mucous membrane has ceased to secrete, if the granulations have been removed, if the conjunctiva has recovered its smoothness, and no longer presents any other traces of the disease except the presence of the saturnine salt, he may consider the patient as perfectly cured.

It is in those cases of granulations, especially those which are peculiar to ophthalmia, called military or contagious, that M. Buys has especially employed the sugar of lead. But M. Cunier says that he has obtained from the salt the best results in catarrhal ophthalmia, acute and chronic, in well-marked capillary hypertrophies, that of great swelling of the conjunctival mucous follicles, in scrofulous blennorrhœa with swelling and relaxation of the conjunctivæ, vascularity of the *corneæ*, and considerable swelling of the margins of the eyelids, and in catarrho-scrofulous ophthalmia of long duration, with ulceration of the cornea.

Lastly, according to M. Cunier, saturnine applications may be employed with the greatest advantages as *abortives*, in all those forms of inflammation in which nitrate of silver is recommended, whether in applying the solid pencil of lunar caustic or in the form of concentrated solution, whether in collyrium or in ointment in a dose more or less strong.

[It is nowhere mentioned whether the opacity of the cornea disappears, and whether the patient perfectly recovers his sight, under and after the treatment now described. Now the great evil of the granular state of the eyelids is that, acting as a mechanical and physiological irritant, it excites and maintains inflammation of the cornea to such a degree, so perpetually and so inveterately, that it renders that membrane opake, and thus deprives the patient of sight. It is nowhere stated whether the inflammation subsides

after the conjunctival surface of the eyelids has been rendered smooth, nor whether the patient recovers sight in any degree or completely. This, it may be observed, is the only genuine test of cure.]

Instance of Poisoning by Arsenic, followed as supposed by Spontaneous Gangrene of one of the Lower Extremities. By Professor FORGET, of Strasbourg. (Gazette Medicale de Paris, September 1849; Archives de Medecine, Fevrier, 1850, p. 222.)

A man, aged sixty-three years, of strong constitution, a dyer, charged judicially with an accusation of rape, determined to put himself to death, by swallowing sixty grammes, equivalent to 924 grains, or fifteen drachms and a half, of arsenious acid, dissolved in half a glass of strong spirits. This he did at six o'clock in the evening of the 10th of June 1848. One hour afterwards, abundant vomiting, then colicky pains, and repeated alvine discharges, took place. Thinking that death was slow in approaching, the patient walked out to the banks of the Rhine, filled his pockets with pebbles, and threw himself into the water. The plunge was heard by the customhouse officers, who fished him out, and brought him to the civil hospital, where he was received, on the 11th of June, at eight o'clock in the morning, about nine hours after he had taken the arsenic.

The face was at this time pale and altered; the feebleness was extreme; the extremities, nose, and ears were cold; the pulse small and frequent; the tongue cold and moist; the abdomen rather painful, with liquid alvine discharges. Intelligence was clear, answers slow, anticipations gloomy, and the patient refused to accept the assistance which was offered to him.

A thick solution of hydrate of peroxide of iron was immediately administered, and alternated with an ether draught. Sinapisms were applied over the legs and arms.

The use of the ferruginous solution was followed by repeated vomiting. Two hours afterwards reaction showed its presence. Heat returned to the extremities; the face was less contracted, and showed more colour; answers were more easily given. At noon reaction was considerable. The face was red and distended; the pulse full and frequent; the skin hot; the vomiting and liquid motions continued.

The hydrate of iron and sulphuric ether were suspended; blood was drawn to 400 grammes, equivalent to twelve ounces and four-fifths; twenty leeches were applied to the epigastric region; and he had four grammes of *leontodon taraxacum*, with nitrate of potass.

In the evening reaction was less forcible; heat and fever had abated; vomiting had ceased; colic pains were less violent, stools less frequent; there was a little abdominal tension, and general depression. The night was spent well, with the exception of a little delirium.

On the 12th June, countenance was natural; pulse 116, well developed; the tongue yellowish, a little dry; the abdomen less sensible and less resisting; one natural motion took place; the urine was, in appearance, normal. On the 13th the symptoms of poisoning had completely disappeared. Since the previous evening the patient stated that he felt in the left leg rather acute pains, which disturbed sleep. This leg appeared not sensibly altered either in volume or in colour; it was a little cold to the touch, and painful on pressure. On the 14th, general condition was the same. There was very acute pain in the left leg, and the toes were remarkably cold and void of colour.

A warm poultice was applied round the left lower extremity.

On the 15th the general state was satisfactory. But the left foot and leg were cold, livid,—as it were cyanosed, with blue patches as high as the knee, very painful on pressure. The pulsations of the left crural artery were less strong and less full than those of the opposite side; the same was the case with the popliteal artery; the pulsations of the posterior tibial artery could not be felt at the lower part of the left leg. Notwithstanding the use of local bleedings, application of camphorated spirit and turpentine, laxatives, and other remedies, the mortification made progress. Nevertheless, as gangrene seemed to be confined to below the knee, and as the patient, who was dying, urgently demanded amputation, M. Rigaud decided on performing it on the 20th of June, ten days after the poisoning. The operation, performed during insensibility induced by chloroform, presented nothing peculiar, except that the divided muscles appeared to possess very little retractile power, and that the operator had to tie no other artery than the crural.

The following days the patient sunk gradually; sphacelus attacked the stump, and he expired on the 1st of July, twenty days after the poisoning, ten days after amputation.

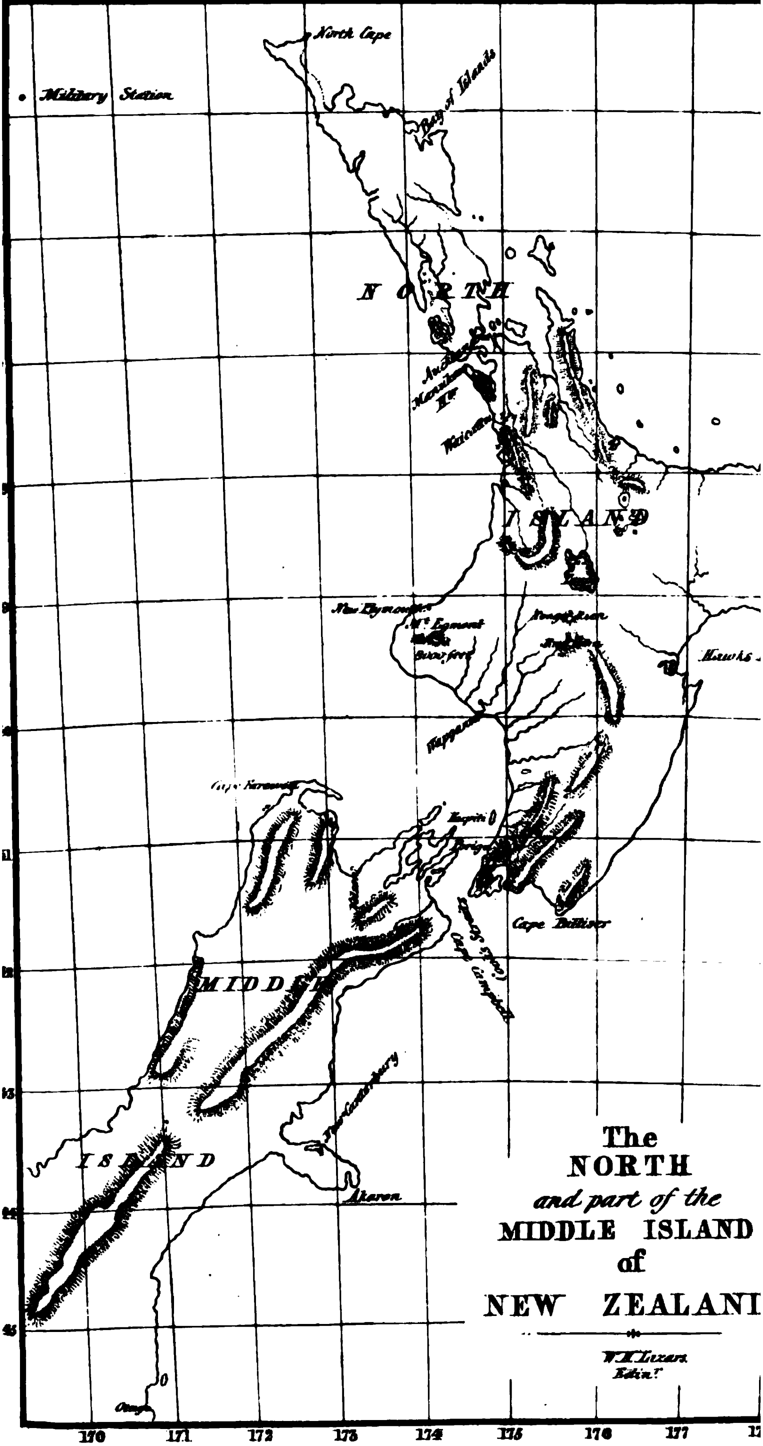
Dissection of the amputated leg ascertained the following circumstances. 1. Mortification of the soft parts in almost their whole extent. 2. Redness in patches of the principal arteries, which were in certain spots obstructed by bloody clots. 3. The veins sound, but containing some clots, yet without trace of phlebitis or suppuration.

Dissection of the crural stump, after death of the patient, showed the commencement of gangrene of the integuments and of the muscles. The principal arteries were thickened, reddish, and contained some bloody clots, soft and not adherent. In the crural vein, close to the section of the limb, was a consistent clot, and above it the vein contained sanious purulent matter as high as the *vena cava*. There were no traces of metastatic abscesses in the viscera.

During life the attendants had ascertained, at different times, the presence of a considerable quantity of arsenic in the matters rejected by vomiting and in the alvine discharges. The presence of the mineral had also been ascertained in the urine to the 25th of June. No trace of arsenic was found in the blood proceeding from a blood-letting performed the second day after the patient's admission into the hospital.

The fact now detailed suggests to the writer in the *Archives* some reflections. First, it is an instance of death not immediately consequent on poisoning by a large quantity of arsenic; and this circumstance, it is thought, may find its explanation in the profuse vomiting and intestinal discharges which followed the introduction of the poison. The most curious circumstance in the case is the appearance of gangrene, called spontaneous, in the lower extremity,—a form of gangrene which is generally ascribed to *arteritis*. It remains to be ascertained whether this *arteritis* recognises for its cause the presence of arsenic in the economy, or if it had taken place spontaneously. The age of the patient might render probable the last supposition. But, on the one hand, the first symptoms of spontaneous gangrene followed so close on the taking of the arsenic, that it may be permitted to believe that this poison has had some concern in the development of this gangrene as an intercurrent affection. All that can be said is, that in the records of science there exists no example of an analogous accident supervening after poisoning by arsenic. The authors who have treated most fully of this species of poisoning,—Orfila, Christison, Devergie, and others,—speak of certain rare accidental occurrences, as palsies of the limbs; but none of them make any mention of spontaneous gangrene.

In attempting to explain the occurrence of *arteritis* and gangrene, it might be asked, Is no account to be taken of the effects of immersion in the cold stream of the Rhine to a man aged sixty-three in the collapse after swallowing so large a quantity of arsenic? How few men of sixty-three, it may be asked, could stand with impunity complete immersion in cold water, probably for some time, and with the cold clothes kept on until they were brought to the hospital? Such a chilling might cause inflammation in any one; and very readily in a person of sixty-three, with, in all probability, the arteries in a previous state of chronic disease.



The
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W. H. Lizars
Edinr.

THE

EDINBURGH
MEDICAL AND SURGICAL JOURNAL.

1st OCTOBER 1850.

PART I.

ORIGINAL COMMUNICATIONS.

Art. I.—*Clinical Contributions to the Pathology, Diagnosis, and Treatment of certain Chronic Diseases of the Heart.* By Charles Ritchie, M.D., Fellow of the Faculty of Physicians and Surgeons of Glasgow, and Physician to the Royal Infirmary, Glasgow. (Concluded from page 33, No. 184.)

In bringing the foregoing serials of arterial disease to a conclusion, it might have been supposed eligible to have entered into some analysis of their symptomatology, resembling that which has been attempted in the previous portions of these contributions in regard to the venous. A principal object contemplated by the writer, however, in undertaking the present inquiry, was to establish some more precise anatomical distinction between the lesions of the heart of which he has treated, than is to be found in the ordinary manner of describing them as dilatation and hypertrophy; and another was to elicit the diagnostic peculiarities of these lesions,—of dextral disease on the one hand, and of sinistral on the other,—as minutely and fully as his opportunities of observation permitted. He ventures to hope that the former of those objects has been in a measure attained in the previous details; and he would now close the investigation by offering a digest of these details, arranged with a view to the latter, and conclude the whole with some observations on the treatment of the sinistral form of heart disease.

1. A large proportion,—in the Glasgow Hospital about 12 per cent.,—of the general disease which occurs, consists of two forms of affection of the heart, in one of which the cardiac lesions arise in the right side of the organ, and are the immediate effects of impeded circulation in the lungs; and, in the other, they commence in the left side of the heart or in the large vessels, and are occasioned by structural changes in the parts themselves.

2. The first, the pulmonary or dextral form, is constituted by emphysema of the lungs, alterations in the size and efficiency of the pulmonary vessels, congestion or inflammation of the bronchial membrane, sanguineous engorgement and enlargement of the whole of the heart's chambers, and augmentation of its weight sometimes to more than one half.

3. The second, the endocardial or sinistral form, is made up of various degenerations of the serous lining of the left heart and aorta, imperfections of their valves, increase of the weight of the heart sometimes to four times what is normal, and permanent dilatation of its cavities.

4. In the dextral or congestive form, the dilatation of the left heart is ultimately as great as that of the right, and is accompanied by narrowing of the aortal and widening of the mitral orifices; the determining cause of all which changes is the pressure on the root of the aorta of the engorged pulmonary artery and upper portions of the right heart.

5. In the sinistral or structural form, the primary degeneratio consist of the so-named fibro-cartilaginous, osseous, atheromatou calcareous, and warty deposits, and of their immediate effects c the left heart; and the more remote changes are regurgitation blood on the lungs, and dilatation of the right heart.

6. When it is the left auriculo-ventricular foramen excl sively which is so diseased in its structure, it is always asso ated with dilatation of the left ventricle and simple contr tion of the aortic orifice, produced, as it would appear, by t pressure, as in dextral disease, of the dilated right heart on the aor

7. The earlier effects of the sanguineous splanchnic congesti which exists in both forms of heart disease, are increase of bulk and functional activity of the involved organs; and, su quently, fatty, albuminous, and fibrous depositions, or ser effusions within their structure or investing membranes, soften of their texture, vitiation or loss of their functional power, a ultimately, atrophy and induration of their substance.

8. The exciting causes of the dextral disease are almost alwa atmospheric. It occurs chiefly in the winter months, and usually distinguished by an obtrusive preponderance of bronchia symptoms, the manifestation of cardiac disturbance being always of secondary urgency, and often little remarked.

9. The exciting causes of the sinistral affection are as uniformly

such as influence the circulation mainly. It appears with almost equal frequency at any season, but principally in persons much exposed to artificial heat, habitual or frequent immersion in water, restraints on the thoracic circulation, or labouring under vitiation of the blood; and, when once established, it is in general excited to activity by exposure of the patient to great physical efforts or to depressing moral causes; and it is then marked by prominence of heart symptoms, the bronchitis being less apparent, or an adventitious accompaniment only of cases of the advanced stage. Thus, of forty cases which were looked at with this view, five were admitted in January, three in February, five in March, two in April, two in May, one in June, five in July, one in August, three in September, three in October, seven in November, and three in December,—or fifteen were summer and twenty-five winter cases; the respective proportions in dextral disease being seven in summer, and thirty-four in winter. Of twenty-six instances of sinistral cardiac disease in females, seven were in puerperal women, in whom the blood may safely be presumed as not in a normal state; and the most common occupations of the male patients were those of blacksmiths, bakers, seamen, dyers, miners, tailors, or shoemakers.

10. The symptoms of the two affections vary according as they are observed in, I. their earlier, or in II. their latter stages.

I.—*In the very early stage.*

11. In the very early stage, and when the parties are at the same time enjoying immunity from any acute symptoms connected with the cause,—from the bronchitis on the one hand, and the inflammation of the heart on the other,—the subject of the latter will appear, to an ordinary observer, to be possessed of perfect health, perhaps even of a higher tone of health than is the average; the cheeks will be florid, the spirits buoyant, and all the animal functions appear to be performed with regularity; while the congestive invalid will present an air of delicate health, there will be some enlargement of the nostrils, a sallow, puffy paleness of the face, if not here and there a slight distension of the capillary veins of the cheeks, and sometimes the chin may be observed to be habitually held at a greater distance from the sternum than is quite normal. On trying the wind of the two patients, also at this stage, the former takes a deep inspiration with little inconvenience, and the latter makes a shorter breath, and has also a fit of coughing; and while the breathing of the individual with disease of the left heart will only be rendered something more frequent by any muscular effort, and one or two insulated, short, dry, expiratory coughs may be thereby excited, the respiration of the other will, in the same trial, become more or less wheezing, accompanied by paroxysmal and double cough, with salival and mucous expectoration; at the same

time that, in the first, a feeling of arrest at the top of the sternum, throbbing or pains within the temples or in the hind-head, with some palpitation at the præcordia, may also be observed, from all which the bronchitic convalescent remains free.

The digestion of the latter also will be variable if not absolutely impaired, and his pulse, when at rest, at a low number, soft, small, and regular; the appetite of the sinistral patient, on the contrary, being often craving, especially for animal food, and the pulse being permanently a little more frequent than 70 beats in the minute, impulsive, strong, seldom much affected by posture, but readily so by heat; and, when the lesion is situated in the mitral valve, the pulse is often intermitting and dicrotous.

On exposing the chest in the two cases at this time, additional important distinctions will be observed. The quantity of adipose matter on the neck of the individual with congestive disease of the right heart, will be strikingly less than in the other, and the accessory muscles of respiration, as the trapezius and the *sterno-cleido mastoidei*, will be better developed; the intercostal spaces will be more deeply indented, and the ensiform cartilage drawn into an unnatural hollow; while the diaphragm and abdominal muscles will be perceived to aid in respiration more than is natural, or than is seen to happen in the other case. In the patient with chronic aortal disease, the carotids, and perhaps the brachial or radial arteries, will be found to throb visibly and to start from their sheaths on any excitement; and in the other, on the contrary, the jugular veins will swell out, especially on coughing; while in the former the veins, and in the latter the arteries, will be respectively in their natural state.

On looking at the cardiac region in the two, that of the sinistral case will have the normal visible impulse of the heart at a point about two inches to the left of the xyphoid cartilage, or this will be stronger than natural, and occupying a broader area; while in the other, there will be no impulse discernible by the eye, or even appreciable by the hand, excepting in the epigastrium.

On percussing the thorax, too, the differences will be equally marked. In the congestive case, the thorax, everywhere, will be more sonorous than natural, and the ordinary dull space in the vicinity of the fifth costal cartilage of the left side will be obliterated; but in the other the sonorousness of the lungs generally will be natural, and the præcordial dulness as in health, if it be not slightly increased. On using the stethoscope, again, the respiratory murmur in the congestive patient will be found to be extinguished in various portions of the lungs, or its place occupied by a small, dry crackle, or by moist crepitus, or by these conjointly, with some wheezing, or low, snoring respiration; and in the other, if the breathing be anything else than natural, it is more or less puerile.

The physical signs noticeable in the heart itself are not less characteristic. It will, probably, have been found, even during the exploration of the lungs, that while the patient was making a succession of long inspirations, the heart's movements have become more impulsive, somewhat tumultuous, and accompanied by forcible succussions. I apprehend that these appearances are dependent on the presence of adhesions of the pericardium both to the heart and externally, and that they are out of all proportion more frequently present in affections of the left than of the right heart. Again, in the example of structural disease, should the lesions be situated in the mitral orifice, or its valve, there will be present, from the earliest moment of inflammatory action, or, should the alteration of tissue be the product of disordered nutrition as in the aged, from the earliest period of the deposition of bone, or other product, an abnormal murmur, of either a blowing or grating kind, absorbing, so far as my experience goes, the first natural sound of the heart, and best heard throughout a space bounded superiorly by the upper edge of the fourth left rib, inferiorly by the sixth intercostal space, on the sternal side by a line somewhat nearer the nipple than the costal cartilage, and, on the opposite side, by another line stretching from the pectoral edge of the left axilla to the apex of the heart below. This I believe to be a reflux or regurgitating murmur occasioned by the return of a portion of the systolic wave into the left auricle during the contraction of the ventricle, and may be further proved to have its seat in the auriculo-ventricular foramen, by this circumstance, that it is not, or only imperfectly, heard in the carotids or any other part of the arterial system.

Again, in the same class of cases, should the lesion be in the aortic orifice, there will be present, and that also as in the last case from the very beginning of the structural change, and associated with a deceitful appearance of perfect health, a bellows or more or less rasping sound occupying the place of the first sound of the heart, and heard with most intenseness along a course extending from the sternal extremity of the third left intercostal space directly across the sternum to the right side, and upward to the superior edge of the second right costal cartilage, and again in the situation of the *arteria innominata* under the proximal end of the right clavicle, and likewise in the carotids, and often in the subclavians, and in the descending aorta within the abdomen. This sound is of course occasioned by the influence of the aortic obstruction on the systolic wave. But in the case of simple engorgement and enlargement of the heart and its openings, there is not, at the period now being described, any abnormal sound recognisable at all. The natural sounds are present, but only somewhat altered; and this alteration, instead of being, as in the case of structural disease, in the systole, is chiefly in the second or diastolic sound of the heart. Both sounds are sharper and more acute than common, in simple congestion, but the first sound is always more or less shortened, and the second proportionally lengthened, so that, instead of the systole being in relation to the diastole, as is the fact in health, as two is to one in duration, it is now as one is to two; or the diastole is in reference to the entire of the heart's revolution, now equal to one half, in place of a fourth only, as is the case in health. And as the character of the sounds is thus opposed according as the disease is situated in the right or left heart, so is their locality. In the latter cases, they have for their centre, either the vicinity of the left auriculo-ventricular orifice, or the course of the great arterial trunks; in the former, they are at this stage most remarkable along the course of the pulmonary artery and right ventricle, or from the cartilage of the second left rib, obliquely across the sternum to near the junction of the fourth right rib with the sternum, and, also from this level, directly behind the whole remaining inferior portion of the sternum. Another feature in these cases. is, that very often the sounds are well heard under the right or opposite scapula, at the same time that, in the præcordia, they are only acute and ringing.

The nature and severity of the related affections of other organs in the two classes of chronic diseases of the heart, are also sensibly different in the earlier stages of both. I have already referred to the state of the respiration, and of the veins in each; and I would only add, that, along with the marked respiratory disturbance, the pyrexial symptoms, such as frequent pulse, thirst, heat of surface, &c., and chronic headach, vertigo, and amaurosis, profuse sweatings from the head and neck, enlargement of the liver, spleen, and kidneys, with functional torpor of the digestive organs, general anasarca, and ascites, as connected with the sluggish state of the portal circulation, and albuminuria, hemorrhoids, and in women leucorrhœa, as occasioned by the habitual engorgement of the *vena cava*, are much more commonly and conspicuously present, at an early stage, in chronic congestion of the right side of the heart, than in inflammatory lesions of the left ventricle at the same period; while in these, again, pain in the head, or at the top of the epigastrium, sympathetic disturbance of different parts of the nervous system, as pain, or numbness in the left neck, shoulder, or arm, in the hypogastrium, the umbilicus, or in the back, and, as I have seen in several instances, in the heels, are most remarkable.

Another important distinction in the two affections is found in the very opposite effects produced respectively on the subjects of them by a residence in a tropical climate. Removal to a hot climate arrests the course of early dextral disease of the heart; but in affections of the left heart, such a change will generally prove highly injurious. There is still another most remarkable diversity of nature observable between these pathological conditions, which it may often be useful to know. I refer to the singularly different modifying influence which each exerts on the progress of certain other diseases, when such are engrafted on either. Thus the subjects of slight sinistral disease sustain the depression of typhus fever better, perhaps, than the same individuals would, had their hearts been sound; and they always require less winè and bear stimulants worse than others do; but the subjects of dextral disease, on the contrary, generally die when attacked by typhus, and always, when undergoing it, demand a greater amount of stimulation than the average.

12. In reference to the symptoms in

II. *The advanced stages.*

The essential circumstance in the pathology of the advanced stage of disease of the left heart is, that the valvular imperfection, whether dependent on a want of correspondence in the size of the valves to the enlarged foramen, or on a corrugation of their own structure, and whether situated in the aorta or in the mitral opening, is increased to a point which admits of constant regurgitation during the diastole of the heart. Hence originate the enlargement successively of the left ventricle, auricle, and pulmonary veins, the oppression of the pulmonary circulation, and the consequent distension of the right side of the heart, the adjacent veins, and the liver, and sometimes the spleen, and even occasionally the kidneys, and the uterine and hæmorrhoidal veins. The element, again, the presence of which constitutes the aggravated or last stage of congestion of the right heart, is the pressure of the engorged right auricle, right ventricle, and pulmonary artery, or of any of these, on the ascending aorta; by which its calibre becomes lessened, the issue of blood from the heart obstructed, the left ventricle stretched and dilated, the mitral opening widened, and the left auricle and pulmonary veins, and again the already overloaded pulmonary artery, right heart, and general venous system, are all, with every renewed contraction of the left ventricle, encumbered with additional blood.

An early,—perhaps the earliest,—effect of these changes, when really consummated, is the establishment of either a double murmur, or of a continuous abnormal sound in the room of the natural systolic and diastolic sounds of the heart. This is equally true of both the classes. In the case of structural disease of the left ventricle, the abnormal systolic murmur, and the healthy second sound of the first stage, the former dependent either on the action on the ventricular blood of the diseased aortic orifice, or on the escape back into the auricle, during the systole, of a portion of the same, or on both causes conjointly, are now exchanged, either for a diseased systolic and diastolic sound, or for these merged in a single, continuous, lengthened, unnatural sound, generally of a loud, or of a harsh, rubbing kind. This I regard as the effect of the increased incapacity of both the sigmoid and mitral valves, now occasioning a free reflux of blood, and some diastolic murmur in the mouth of the aorta, and perhaps also a murmur on the contraction of the auricle, in addition to the systolic murmur, already existing in the first stage. And in the other description of disease, or the congestive, the comparatively feeble, acute, and snapping unnatural sounds, accompanied by great prolongation of the second sound, which mark its commencement, are, at this period, also found to be represented by an unnatural systolic and diastolic murmur, existing either separately, or, in the intenser forms, merged into one uninterrupted and loud plane sound, heard in aggravated cases over the whole precordial space, but in others, chiefly at the aortic and mitral openings.

In both classes of cases there is much feeling of discomfort, of exhaüstion, of syncope, with moaning, a hurried manner, inability to recline, frequent gasping for breath, rapid respiration, cough, painful distension of the epigastrium, loud belchings of wind, palpitation of the heart, startings out of sleep, anasarca, sometimes ascites, dulness on percussing the heart, and a loud sound on using the stethoscope; and it would now more than ever be difficult, on a slight or cursory examination, to say whether any individual case belonged to the one or to the other of the forms of heart disease under present review.

13. Attention to various circumstances in both will aid us in the inquiry.

First, It will commonly be found that the subjects of the first, or congestive form, have had more or less violent, and long-continued, or reiterated attacks of bronchitis, and that those of the other have either had rheumatism in some shape,—often in an aggravated one, but not rarely limited to the shoulders and trunk only,—or that they belong, 1*st*, to a class of individuals, possessing what seems high, vigorous health, who have been seized suddenly with alarming symptoms of pulmonary congestion, the endocarditis, of which they have been the victims, having occurred in a latent form some years before, and been mistaken for an attack of indigestion or a cold, while its sequelæ have been endured almost in unconsciousness throughout the interval; 2*d*, that they, if females, have been pregnant, and fallen into bad health during lactation, the condition of the blood in pregnancy appearing to give a predisposition to endocardial disease, although this inflammation is seldom detected till it has terminated in structural lesions; or, again, that they have been the subjects, at some former period, of acute primary albuminuria, from which the kidneys never recovered; or, 3*d*, that they are aged persons in whom depositions of albuminous, phosphatic, or bony matter have happened in the heart, without any recognisable rheumatism or other cause of endocardial inflammation having preceded them.

Second, The external aspect of the two patients, although the same in many respects, will yet be found to differ in many more.

a. The subject of inflammatory or other degeneration of the left heart will be either deadly pale, the albuginea of the eyes of a pearly whiteness; or there will be a strongly defined purple redness on the cheeks, all else being of a chalky or dirty whiteness, excepting the lips, and sometimes the nose, which are of a faint violet or rose colour; but, in the other, the whole face and ears, the tongue, and often the internal mouth, as well as the lips, will be of a livid hue. The swelling and violet hue of the tongue, and the fulness of the ranular veins, will also be more conspicuous; and while here, also, the superficial veins of the limbs will, from long-continued distension, be tortuous, in the former case, the arteries, the radials for example, are often found in this state.

b. Again, both patients will be found more or less propped up in bed; but, in the congestive, the thoracic oppression will be more striking, and the patient will probably be seen with his lower limbs thrown over the sides of the bed, or, if reclining, he will be reclining forwards, a contrivance intended to get quit of a quantity of superfluous venous blood by the legs, and to increase the capacity of the chest, if not also specially to relieve the aorta from the pressure of the blood in the right heart. It might be supposed that, as an obstacle to the free egress of blood from the pulmonary veins is, at this advanced stage, a chief element in the constitution of a sinistral case, the symptoms of plethora in the lungs must necessarily be equal in the two forms. Yet such is not found to be the actual fact. The indications of a loaded state of the areolar vessels of the lungs are far from being equally marked in the structural form of cardiac disease as in the congestive. Pulmonary hyperæmia is essential to every stage of the one, and is an accidental concomitant only of the other in its most advanced stage,—a fact explicable alone on the supposition that a mechanical impediment to the transit of the blood by the extremities of the pulmonary artery and radicles of the pulmonary veins, induced, perhaps, by previous dilatation and extension of the cell walls, is one of the earliest elements in the pathology of the congestive form of heart disease.

c. Again, when the symptoms are in great intensity, neither patient can rest on the left side, but while in the endocardial form, this peculiarity remains under every usual degree of mitigation of the symptoms; in the other, it disappears precisely almost in proportion as the congestion abates. And so is there, also, a difference in the cause of this symptom in the two affections. In the arterial, it is the contact of the overgrown heart with the ribs, consequent on the recession of the lung to the upper part of the thorax; and in the venous, in which the size of the heart is less, and its covering by emphysematous lung persistent, it is the augmented pressure, in this posture, of the right heart on the aorta which prevents the patient from reclining on his left side.

d. In the latter affection, the patient may be observed at intervals to throw back the head suddenly, and make a deep inspiration of a wheezing kind; in the former, the breathing in bad cases is expiratory and loudly panting, and every pulsation of the heart communicates also to the head, and often to the whole body a succussion, which is unknown in the other.

e. Again, in the congestive, the anasarca and ascites are at this stage commonly excessive, and the hands, feet, and nails are livid; but, in the other, the swelling is for the most part limited to the legs and fore-arms; and although the nails are sometimes of a dark hue, the skin is colourless, or even bloodless.

Third, On examination of the præcordia, it will generally be found larger than natural, and there will be irregular, vibratory, sometimes vermicular-like movement of the intercostal spaces, and a simmering or purring sensation perceived by the hand in the subject of the inflammatory form, and none of these in the other. There will be dulness on percussion at the præcordia in both, but, in the endocardial, it will be as high as the level of the fourth rib perhaps, and situated also chiefly to the left of the cartilages of the left ribs, and, in the other, it will be at the bottom of the sternum; and while, in the former, the dull space is either persistent or progressive, in the latter it diminishes in extent with the improvement of the case. With the above-mentioned exception, percussion of the thorax in the congestive patient will give out a clear emphysematous sound over the whole of the lungs, which, in the other, is limited to their upper portions, unless that in the congestive form, the lungs themselves or the thoracic parietes happen to be œdematous, circumstances which are rarely seen in the structural cases.

In the latter, again, the bronchitis which may be present is always secondary to the palpitation and dyspnœa, and is generally also merely an accidental graft on the disease, the fruit of exposure to cold and wet, and which is limited commonly to the larger tubes; but, in the former class of cases, the bronchitis is primary, essential, and often extended to the capillary bronchia, so that the rhonchi are universal over the thorax, of the most copious and superficial kind, and almost as readily detected by the hand extended on the ribs as by the use of the stethoscope.

Again, in the same description of patients, the dyspnœa present exists independent of any physical exertion, and precedes the anasarca sometimes for years; while, in the sinistral cases, there is often little dyspnœa excepting on the occasion of some muscular effort; and when at length this symptom does become permanent, t is in them also immediately complicated with anasarca. In sinistral cases, the palpitation, dyspnœa, and dropsy, are generally excited by the patient's previous exposure to fatigue; and, in moderate attacks, these symptoms will frequently subside by means of rest alone, an issue which cannot be anticipated in the other form of heart disease.

The cardiac sounds discovered by auscultation are very similar in the two kinds; but, in the congestive, they are for the most part softer and less loud than in the other; and in proportion as the patient's situation improves, they become fainter, and, at length, in a state of rest, completely disappear; while, in the other, they never cease under any degree of improvement, but often do so when the powers of life are flagging, or when the obstruction has become excessive. Again, in the former, in consequence of the heart being covered up on all sides by emphysematous lung, an extremely bad conductor of sound, and the lungs also emitting loud and varied kinds of bronchitic rhonchi, it often happens that the cardiac murmurs are heard with much difficulty over the præcordia, and it is required, in order to ascertain the precise character of these, to place the stethoscope on the carotids, in which the aortic sounds at least are uniformly repeated with great distinctness and accuracy, while, in the endocardial cases, any such necessity seldom obtains. The murmur which is heard at this period, also, is, in the congestive patient, exclusively regurgitating, and formed in the systole by the reflux of blood along the mitral, and in the diastole by its recession at the aortic orifice; but in the individual labouring under structural disease of the valves, the murmur is for the most part an onward one on the heart's contraction, and retrograde only during the dilatation. In the circumstances presumed, also, while in the latter patient the diseased sounds would be well heard along the great vessels, those of the former will be much fainter, and often limited to the diastole.

4th, The veins are enlarged in both forms, but in the dextral there is often a jugular, and sometimes even a brachio-cephalic venous pulse, produced by a reflux portion of the right ventricular wave being propelled through the wide tricuspid passage on every contraction of the heart, while in the typical sinistral form this never happens. Again, in the latter class, at least when the aortic valves are affected, nothing is more common, so long as the heart retains vigour, than to see the carotid, brachial, and other superficial arteries leap violently from their sheaths at every diastole of the heart. In this state they have a quick or sudden impulsive motion, and to the touch appear full and unyielding,—all circumstances in strong contrast with what happens in the other class, in which the systemic arteries are universally relatively empty, shrunk, and enfeebled.

The astonishing frequency of the pulse in endocardial cases is another important feature in their history, and one which is also limited to them. It is rare to find the pulse in congestive subjects more than 120, but in those others it is often 140, and even 160 per minute; and it is also in greatly enfeebled hearts of this kind quite usual to see a difference of 40 or 50 beats between the pulse at the heart and at the wrist. In both sorts of heart cases there is a certain character of impulsiveness in the pulse, proceeding probably from the increased efforts made by the left ventricle; but, while in aortal cases the pulse is tense as well as impulsive, in dextral disease it is soft and compressible.

5th, Again, in regard to the related affections in the two, paroxysmal dyspnœa, or violent attacks of orthopnœa, bilious vomiting, incessant purging, sweating, diuresis, and secondary albuminuria, gangrene of the genitals or limbs, although not confined exclusively to either, are all much earlier in their occurrence, and to this extent at least also more common in congestive than in endocardial disease; and the solidification of lung by effusion of blood into its cells, and the hæmoptysis which often complicate both forms, happen, according to my observation, most readily on the sides which correspond to the chief seat of the heart disease.

Gangrene of the left mamma happened in two recently lactating women, the subjects of mitro-aortal disease; and jaundice was a very common precursor of an immediately fatal termination in endocardial cases, rarely, if ever, seen in the pulmonary form; and the same remark applies to petechiae appearing on the extremities.

6th, The necroscopical appearances differ in each. In the examples of the bronchial forms, fluid will be found flowing copiously from the mouth and nostrils, the areolar tissue gorged everywhere with serum, and the legs occupied by the remains of bullæ. The thorax now, instead of being extremely sonorous, as was the case during life, will be pretty extensively dull from the œdema of the lungs, and the pleural effusion. On opening the thorax several gallons of this will be got in either, or in both sides, and often from four to a dozen of ounces in the pericardium. The lungs, although thus compressed, will still be crepitant, and covered with large effusions of air under their pleuræ; and, even when not condensed by a mechanical cause, they will often be found in old cases to have undergone certain vital degenerations, by which their bulk is diminished; their subserous cellular tissue is condensed, and their pleural covering is occupied by fibrous bands and secondary membranes. The sides of the thorax will often be lined by laminated strata of pale-coloured fibrin, and the bronchial membrane will be observed of a purple hue, and collected into longitudinal lines of considerable density.

The heart, its right side especially, will be found enormously distended,—increased in circumference to seldom less than twelve, instead of eight or nine inches; and in its long diameter, to seven inches instead of four. Its weight, when cleaned, will not be proportionate to its size, but will yet sometimes be as high as twenty ounces or more, instead of eight, the normal average. Its structure will be of a deep inky colour, and very friable, and its walls, those at least of the right auricle and ventricle, will have become diaphanous. The cavities just named will be found united, from the enlargement of the opening between them, into one continuous chamber. The valves in unmixed cases will be of healthy structure, but, with the exception of the aorta, which is diminished in diameter often to near a half, all the other openings will be observed greatly enlarged. A conspicuous feature in every case is the pressure exerted by the right heart, and particularly by the pulmonary artery on the mouth of the aorta.

In respect to the abdominal viscera, the liver, spleen, and kidneys will be diminished in size, indurated, and changed in texture precisely according to the previous duration of the case.

In the endocardial form, again, the chief peculiarities are the greater size of the left heart in particular, its greater density, and the increased weight of the whole organ; this latter ranging often from twenty to thirty ounces or more, and the thickness of the left ventricular walls sometimes being more than an inch. The left ventricle is not a flaccid bag as in the other case, but a capacious persistent chamber, and the valves are converted either into dense cartilage or bone, or into a mixture of each. In some instances the left heart will, indeed, be found eminently soft and flaccid, but in such there is also a conspicuous obstruction in the mitral opening. In others, again, there will be enlargement of the aorta, and multiplied alterations in its coats, and in those of all its larger divisions.

The pleural effusion is seldom so great as in congestive cases, and is oftener mixed with blood.

The lungs, also, particularly on the left side, instead of overlapping any part of the overgrown heart, will be pressed up towards the clavicle, and often out of sight; and here also they may often be found in a state of recent but intense hyperæmia. Interlobular abscesses, and different degrees, often high states of pericardial inflammation are frequent, and it will sometimes happen that, when the left lung has sustained long-continued compression by the heart, the opposite lung is emphysematous, and the right thorax enlarged in circumference to the extent of an inch.

The abdominal viscera, also, instead of being shrunk in size and hardened in texture, as is the case in the congestive form, are, from the more acute character of the affection, in general still at death in the period of enlargement and softening; the liver, spleen, and kidneys being all in the earlier stages only of granular degeneration.

Seventh, There are many particulars connected with the causes and treatment of the two forms of heart disease, which present strong points of contrast, as they occur respectively in cases of either.

a. The advanced and aggravated examples of the uncomplicated sinistral kind, generally owe the sudden development of their violent symptoms to some cause which has wasted the vital power of the heart, as severe or protracted muscular efforts, or depressing moral causes; but the same description of cases of the dextral form are usually ushered in by a catarrhal or bronchitic attack, after exposure to cold and wet.

b. Again, in the latter class of patients, the symptoms are introduced by a febrile state, exciting to increased action of the heart, but in the former by a state of exhaustion, compelling the heart to augmented efforts for the maintenance of the circulation.

c. Again, in neglected cases of the dextral form, the assemblage of great dyspnœa, lividity, dropsy, soft, feeble pulse, &c., suggests, on a first view, such strong evidence of the presence of great debility and congestion, as would induce many practitioners to prescribe cordials, stimulating expectorants, and excitants of various sorts, which, when employed, rarely do good; while, in the same kind of sinistral cases, the heart occupies so great a space in the thorax, the difficulty of performing its functions is so extreme, and the lungs being thrust much aside, and the heart pressed closely on the enlarged and projecting liver, so great, extended, and sometimes violent a pulsation is perceived from above the nipple to the umbilicus, as, with the throbbing of the carotids, and perhaps the jerking feel of the pulse, constitute a reunion, which has often led the physician to employ some form of blood-letting, but always without good, and often with most disastrous effects.

d. Again, although the detraction of blood could not, with propriety, be resorted to, in either of the conditions of disease now referred to, and both of them would receive benefit, with certain modifications in each, from means fitted to equalise the circulation; yet it is true, as a general fact, that dextral cases bear depletion of blood, local bleeding in particular, better than sinistral do, and that severe old standing instances of the latter generally require cordials.

e. Again, the alterations in the structure and capacity of the heart and aorta, being of a more textural, complete, and permanent kind in sinistral than in dextral disease of the heart, the cavities accommodate themselves with more difficulty to sudden changes in the quantity of their contents, and such cases are therefore more injured by rapid losses of the fluids than those of the dextral form.

f. Again, in dextral cases, there is often such an amount of bronchitis present as arrests the general secretions, and diuretics will not act till this state be removed; whereas, in uncomplicated sinistral, no hindrance of this kind being present, diuretics, as a general rule, act readily.

g. Emetics, again, and also hot baths, are sometimes of great benefit in the venous cases; but the same remedies will always prove hazardous in the arterial.

14. Referring to former parts of these contributions for the treatment of the congestive or pulmonary form of heart disease, I shall now conclude with some observations on the proper management of the other,—the structural or endocardial.

15. This form, having its initiative in an endocarditis scarcely perceived and seldom understood, or in inflammation of the pericardium, or in an attack of pneumonia, or in a low species of diseased action in the serous lining of the left heart or aorta, and having in general a lengthened latent period, from which it becomes developed into violent activity by some exciting cause, as fatigue, excessive grief, &c., the right side of the heart, and all the associated viscera, as the liver, &c., being now involved in the congestion which was for a short period of the course of the case limited to the left, is met with in practice in considerably different states of the heart, of the blood, and of the general strength, and also under various aspects, as complicated by a recent inflammation of some organ, as of the pericardium, bronchial lining, or lungs; or an hemorrhage, as from the nose, or lungs, or stomach; or by the accession of cerebral symptoms, as coma and palsy; or with tubercle, or with various diseased states of the kidneys.

16. These numerous and very diversified arrangements of the elements of this affection, may conveniently be grouped together, as they are met with, *first*, in cases in which the latent period has been comparatively short, the heart is only moderately enlarged, the blood is not remarkably altered in quantity or constitution, by being collected into masses within the internal organs, or by hemorrhages, or serous effusions, and in which the general strength is still of an average kind; and, *second*, cases presenting more or less of the opposites of these conditions.

17. As general remarks, applicable to all the kinds of these cases, it may be stated that their treatment is strictly palliative; that it cannot be trusted to any one principle long, and much less to any exclusively; that beneficial results are rarely attained unless from the judicious admixture of different and sometimes of conflicting remedial principles; and that these results, when so obtained, are very evanescent, the tendency to relapse and to the rapid extension of organic mischief being as remarkable features of the advanced stage of the disease, especially when neglected, as immunity from them is of the earlier.

18. The treatment will vary according as it is instituted in—

A, The period of quiescence or latency; in

B, That of the acute symptoms; or in

C, The period of convalescence from the more violent symptoms which constitute the aggravations of the disease.

In the first of the conditions stated there is, in aortic cases, no sensible regurgitation of blood on the ventricle, and in mitral but little on the lungs and right heart; and, of course, no marked affection of the systemic venous circulation and associated viscera in either. A systolic murmur is the most prominent indication of disease of any kind.

In the second, full and maintained regurgitation on the right heart and corresponding organs, with alterations in the size of the heart's walls and cavities, and great functional disturbance of the whole splanchnic system, are main elements in the case. The cardiac murmur is now probably a double one, or, in severe seizures, the two murmurs are coalesced into one lengthened, harsh sound.

In the third condition, or that of convalescence from the violent circulatory disturbance of the second period, the action of the heart has become, to a certain extent, tranquillised, and the functions of all the other organs more or less restored; but the heart remains enlarged, its valves more or less imperfect, and the general viscera to some extent or other altered by still existing congestion, and previous sub-acute inflammation. The physical signs of the second period remain, with various modifications of their intensity.

19. A. The latent stage of the affection may remain undisturbed in favourable circumstances, especially if the case be aortic, for so long a time as fifteen or twenty years, or, it may be, longer. This happens chiefly in persons not exposed to causes which disturb the circulation, increase the quantity of the blood, or diminish greatly the vital energy. An attack of thoracic inflammation, occupations which cramp the aortic circulation, a life of repletion, a pregnancy or protracted lactation, or exposure to cold, fatigue, famine, mental depression, sudden alarms, or other exhaustive influence, are all so many introductions to the acute seizure; and it is obvious, therefore, that, in the proper management of individuals in the earlier or latent stage of structural disease of the heart, such causes must be sedulously avoided. Such a measure of seclusion from atmospheric influences, physical and mental effort, and full living, as is consistent with the maintenance of what is called good condition, should be aimed at. A mild, bracing, and steady climate; level roads; easy occupations; an upright, erect position of body; a rather dry, nutritious, but not stimulating regimen, carefully adjusted in its quantity to the amount of excretory waste; a free state of the bowels; a copious secretion of urine; and a healthy, perspirable condition of the skin, got by

sponging, rubbing, &c., and guarded by the employment of suitable clothing, are each well suited to be useful.

Should the cardiac lesion have risen out of a rheumatic inflammation, the recurrence of another such attack must be sought to be prevented. A good means to this end is an alterative course, from time to time, of colchicum and alkalies. Twenty drops of the wine of the seeds of colchicum, and ten or twenty grains of the sesquicarbonate of potash, dissolved in tepid water, and taken once, twice, or thrice daily, for a month at a time, is a combination which does very well.

Should the case, again, have originated in a condition of primary albuminuria, the appropriate treatment for the lesions which may remain in the kidneys and in the blood, will require to be conjoined with that which is best adapted for the affection of the heart itself. The steady and constant employment of the compound powder of jalap as a hydragogue, and of tepid baths, with the occasional exhibition of some preparation of iron, as the syrup of the iodide of iron, or the saccharated carbonate, will often prove serviceable.

20. B. The second or cumulative period of sinistral disease of the heart may consist of—

1*st*, The mere consummation of a gradual reflex movement of the blood on the right heart and splanchnic system, accompanied by pulmonary, hepatic, and renal congestion, subacute inflammations, dropsy, and, perhaps, by pulmonary hemorrhage.

2*d*, It may be constituted by a certain amount of these pathological conditions, or of one or more of them, united with cerebral congestion, or bloody or serous effusion, in the form of apoplexy or of palsy.

3*d*, Or it may be either the immediate result of a recent attack of aortitis or of some other acute inflammatory lesion in the heart, pericardium, or lungs, with or without hæmoptysis, or be merely an example of the first variety, complicated with any of the inflammations now mentioned.

21. The treatment in all the varieties will be subject to be modified according as the patient belongs to the first or the second of the denominations referred to at 16; and, also, according to the point in the scale of either of these latter at which he appears to stand; and while such modifications are kept in view, each of the varieties also must be treated according to its own principles. Thus, a case which belongs to the third variety now (20) mentioned, and to the first group referred to formerly (16), will absolutely demand blood-letting, both general and local, and a strict enforcement of the antiphlogistic regimen; while another which belongs to either of the other varieties, even while it falls

under the first of the categories spoken of at 16, may do no more than bear such measures ill, or become injured by them.

22. The subjects of the first variety (20) having passed through a long comparatively latent stage, present the full development of most of the primary and secondary pathological changes of which the disease consists, and, as a general rule, bear depletion of blood ill. Should there be great tumult of the heart's action, much regurgitating murmur, violent saltatory movements of the arteries, jerking pulse, and at the same time no evidence of the presence of active inflammation anywhere, the prohibition to the use of even the cupping-glass or leeches becomes more absolute; and when such appearances are succeeded by any extinction of the heart's sounds, or when the pulse at the heart is as high as 130, and especially when any of its pulsations are not repeated at the wrist, the prohibition is complete. The indications of treatment usually are, to relieve local congestion, and support the circulation. In cases above the average in general vigour, it may sometimes be desirable, as when the kidneys are so greatly engorged with blood as to have had their secreting power nearly suspended, to draw blood from the loins; but with this exception, and that also of some acute cases of hyperæmia of the lungs, mere congestion of any organ does not demand depletion of blood. Should hæmoptysis be profuse, or even when moderate, and the portion of dull lung considerable, the lancet may be tolerated in young, robust subjects; but in general, even here, the tartrate of antimony, in grain doses or less, repeated every two or more hours, and accompanied by means fitted to relieve the portal and inferior cava veins, and by counter irritation over the thorax, will be preferable. Of these means, in such a case, the best are frequent doses of the acetate or bitartrate of potash, with or without calomel premised, and the warm sitting or foot bath. The most suitable counter-iritant is a large cantharides plaster.

Should the principal seat of accumulation of blood be the liver or the spleen, warm fomentations to the parts, constantly maintained, saline purgatives, the supernitrate of potash, or the hydriodate of potash, alone or combined with ipecacuana, cream of tartar, or dandelion, suit well in subjects who have some strength remaining; and in others who are more cachectic, the oil of turpentine in purgative doses; combinations of sulphur, nitre, quinine, or of sulphate of magnesia, with a chalybeate; or of the muriate of ammonia, taraxacum, and extract of chamomile, often prove useful. It is indispensable in the latter class of patients to watch the effects of purgatives and diuretics, on the heart's strength, fatal syncope having been frequently induced by both.

Associated with these remedies in the slighter cases, and after their use in such cases as are more severe, small, frequently-repeated doses of some mercurial are quite indispensable. A course, regulated according to the strength of the patient and the urgency of the symptoms, of calomel, muriate of mercury, or blue powder, along with evacuants of the bowels and kidneys, and suitable attention to the state of the skin, and of the circulation, and of the general strength, comprise, indeed, everything of main importance in the medical management of such cases.

Strong doses of diuretic medicine seldom succeed well in this affection. Catharsis or strangury, or both, will often be induced; and where there is much tone of constitution left, marked by floridity of countenance, &c., or where there is any fever or evidence of acute renal congestion, the use of cantharides or squill should be avoided, and the digitalis in infusion be preferred. In the class of cachectic subjects so often met with labouring under confirmed endocardial disease, the squill, or, should the patient be very anæmic, the cantharides, often occasions diuresis; and in a few rare cases of this kind the digitalis, when these have failed, may be cautiously employed in conjunction with large doses of camphorated ammonia, and the use of other diffusible stimulants, as gin, or some bitter tincture, as that of quassia, &c. The supernitrate of potash has the advantage of acting more rapidly than most other diuretics. It often creates diuresis by the second day, and may conveniently be conjoined with frictions of mercurial ointment, instead of calomel given by the stomach. Sinapisms to the loins, constant fomentations, and the use of the sitting bath for an hour at a time, assist the diuretics.

The skin is usually dry, wrinkled, and desquamating, and benefit results from having it rubbed daily with a flannel towel wrung out of hot soap-suds, or out of warm vinegar and spirit, or sea water, or a solution of bay salt; and the acetate of ammonia and ipecacuan may be added to the cathartics or diuretics with the same view. The surface should, of course, be protected by flannel coverings; and when it does not occasion fatigue, the tepid, or, when the heart is not excited by it, the warm bath even may be used.

In respect to the best means for quieting the tumultuary state of the heart and circulation, rest—absolute rest—is indispensable, and is often all that is required. No physical or mental efforts can be permitted, and the patient should be carefully guarded against all impressions on his moral faculties of a depressing or alarming kind. A cool atmosphere, a free circulation of air, a firm hair mattress, few and light bed-clothes, and frequent tepid sponging of the extremities, when it can be done without effort on the part of the patient, are all necessary, and often advantageous. In most instances of the disease, in which the general strength remains considerable, it is necessary that the means employed, as the hydragogues and diuretics, for the relief of the other viscera, shall have acted efficiently before the heart becomes tranquillised; and in examples of the complaint in which debility is the chief element, it will be necessary to give wine. This, in such cases, often brings down the pulse and the rapidity of breathing with certainty; and it may be conjoined, if requisite, with ammonia, camphor, and sulphuric ether. The quantity of wine may be made to vary in suitable cases, from four to eight ounces, or more, in the twenty-four hours. Such a quantity cannot be continued long, and even a smaller amount persevered in daily for a month or so, has frequently done harm. The employment of wine in unsuitable instances of the disease, and in large doses, has often proved most mischievous, by the induction of head symptoms, and sometimes of pericarditis. In some instances, the use of large doses, as three, and even four grain pills, of opium, has succeeded in quieting the violent and tumultuous movements of the heart. In others this symptom has become lessened during the employment of the infusion of foxglove in half-ounce doses three times daily. On some occasions the functional disturbance of the heart has been evidently hysterical, as when it happened at the menstrual period. The combination of sinistral cardiac disease with hysteria is, indeed, rather frequent, and it is often attempted to be treated by blood-letting, but with the most calamitous effects. An assurance on the part of the medical attendant of the safety of the patient, and the employment of ammoniated tincture of valerian, will generally quiet the symptoms.

As to the food best adapted during the tumultuary symptoms, it should consist, in the more sthenic class of patients, of farinaceous jellies, and roasted or stewed succulent fruits, adding animal juices or jellies in proportion to the freedom of the case from such symptoms as thirst, hot skin, dry tongue, headach, or flushed countenance. The drink ought to be sparing in quantity, unless in cases where diuretics do not act, when cream of tartar solution, or weak tea or coffee, or buttermilk, and other diluents, may be more freely indulged.

23. The causes of the head symptoms in the second variety (20, 2*d*) of the cumulative or tumultuary stage of sinistral disease of the heart are various, and our views of its most appropriate treatment, and of its prognosis, will be influenced accordingly. Sometimes the cause appears to lie in the increased power of the left ventricle, sometimes in an extension of the degeneration of the arterial coats to the vessels of the brain, and at other times the sopor or paralysis would seem to be dependent on the plethora of the right heart and cephalic veins, and at others on nervous irritation transmitted from the enlarged liver.

It is a rare occurrence when general bleeding does good in such cases. They often bear a first bleeding, if of moderate amount, without any obvious evil effect; but if carried so far as to induce a sense of weakness, it most frequently aggravates all the symptoms. Sopor and mild delirium is thus converted into coma, and a benumbed state of the limbs into complete paralysis. When the force of the circulation is much increased, the tartrate of antimony, given to the extent that it is tolerated, is a greatly more eligible remedy; and in all descriptions of case, the croton oil, alternated with small doses of blue pill, or calomel, will be fitted to do good. Shaving of the head, and the use of evaporating lotions, will also often prove beneficial; but blisters are likely to do harm in proportion to their severity and propinquity to the brain. The various other remedies fitted to relieve the loaded state of the heart and other organs, mentioned when treating of the last variety, will be equally advantageous in this. The free evacuations from the bowels, kidneys, and skin, are, indeed, the best means, after the employment of the tartrate of antimony, or the blue pill, for the relief of the cerebral complication. Recourse to stimulating embrocations and frictions of the palsied limbs, and their needful protection and support by flannel bandages, should not be neglected.

24. In respect to the third variety (20, 3*d*), or that complicated with inflammation, the nature of the case, and of its management, will receive modification according as the inflammation may be merely a collateral one in another organ, or may be situated in the heart itself; and also, as the patient may be robust or cachectic in constitution.

As a general observation, it may be stated that the case will bear active measures very much in proportion to the distinctness with which the inflammatory lesion is developed. Where the symptoms peculiar to the chronic endocardial disease are aggravated, those of the acute inflammation will be overshadowed and masked; and even when the recent phlegmonous action in such cases is in the aorta, or in the substance of the heart, and also in the pericardium, the same remark will be verified. In fresher or less complicated cases, in which the tumultuary stage is ushered in by a recent inflammation of the heart, the circumstances are different, particularly in robust individuals. Here there may be much intermission and softness of the pulse, with great rapidity and increased frequency; but the oppression at the præcordia, the pain radiating from the heart in various directions, and the auscultatory phenomena, will generally guide us to the discovery of what is wrong, and then the general principles which regulate our treatment of such affections, when entirely uncomplicated, must be enforced here. Small bleedings in patients who can bear larger ones are often useless, or rather mischievous; but it seems much more expedient, when the heart's chambers are still of normal size, to follow up one such effectual venesection, and probably cupping, by the use of tartrate of antimony and calomel, than to trust to the rapidly and often repeated exclusive employment of smaller bleedings.

One of the first effects of an intercurrent inflammation in endocardial cases, is the arrest of the urinary in common with the other secretions. In complicated and severe examples of the affection, when the inflammation, say of a portion of lung or of the pleura, is not clearly indicated by the ordinary symptoms, this suppression of the secretions, and the refusal of diuretics to act, are very significant intimations of what has happened, and ought in most instances to be met by the use of calomel and opium, and some kind of counter-irritation.

25. C. When we are so fortunate as to succeed in calming the disturbance of the organs which constitutes the cumulative or tumultuary stage, the management of the convalescent period will demand our anxious atention. The disposition to relapse is most eminent, and the most ordinary causes of this, when it takes place, are over-feeding, too much stimulation, fatigue, exposure to cold and wet, and the permitting the amount of ingesta to exceed habitually that of the excretions. A strict observance of whatever precautions are calculated to prevent these evils must be enforced. A generous diet, if accompanied by the habitual use of some laxative and diuretic, or the weekly exhibition of a hydragogue cathartic, is what will answer best. The healthy condition of the skin must be maintained by tepid saline baths, and frequent sponging, and a flannel under dress. A removal to the country, and residence in a warm and dry house, on the low floor, would be desirable. Iron, cod liver oil, vegetable bitters, as quinine or colomba, taken along with nitre, will each be useful in individual cases; and, generally, the same principles and details of treatment referred to under (19) the head of the latent period of the disease, will be applicable here.

In conclusion, I beg leave to state, that in the foregoing contributions it has been my purpose to give a strictly clinical, and in no sense a literary, history of the lesions of the heart of which they treat; and that I have been prevented, only by this specialty in the plan of these papers, from accompanying my observations with that continued reference to the labours of others and to the facts of the inquiry already ascertained, which would otherwise have proved so gratifying to my feelings and enriching to my communications.

ART. II. *Two Cases of Rupture of the Crucial Ligament of the Knee-Joint.* By JAMES STARK, M.D., F.R.S.E., Fellow of the Royal College of Physicians of Edinburgh.

MR S., on the evening of 8th June 1839, was wrestling in sport with one of his friends, when their legs got interlocked, and something gave way in his right leg with a snap, audible to the others in the room, and he fell down. Those in the room, from hearing the snap, imagined it was the bone of the leg, or of the thigh, which had broken across; but Mr S. himself was so unconscious of having received any injury, that, while still on the ground after his fall, he said the noise must have resulted from his trouser-strap giving way. He therefore attempted to rise, when he found he had completely lost the power of supporting himself on the right leg, and that the trouser-strap of that leg was uninjured. Several medical friends being present, his leg was immediately examined, for the purpose of ascertaining the nature of the injury.

The bones of the thigh and leg were uninjured. There was no dislocation of either ankle or knee-joints; no displacement of the knee-pan; no rupture of the *tendo Achillis*, or of any of those around the knee-joint. He had the perfect command of all the motions of the ankle-joint, and, when sitting, appeared also to have the command of the knee-joint, in so far as its ordinary motions were concerned. When he assumed the erect posture, the knee-joint was found to be preternaturally moveable; and whenever any weight was endeavoured to be thrown on the right leg, the knee fell against the left leg, *and bent with equal facility forwards or backwards.* When he sat on the ground with the legs stretched out, the slightest pressure on the patella caused the foot to be thrown upwards, *and the leg could be bent forwards on the thigh to a certain extent.* No pain was complained of in the knee-joint, but only a sensation of weariness; and there was no redness, or swelling, or effusion of blood.

The whole symptoms, then, clearly indicated rupture of the crucial ligament of the knee-joint, and the same evening the injury was received, I made several trials to ascertain the accuracy of the diagnosis. When the knee was bound tightly with a handkerchief, and kept slightly bent, the patient could almost bear the weight of the body on it, but the moment he endeavoured to straighten the limb, he lost all command of the joint, *the knee bent backwards under him*, and he fell to the ground unless supported. When the leg was bent on the thigh, at nearly a right angle, all the tendons of the muscles of the thigh which form the outer and inner hamstrings could be distinctly traced, none were ruptured. The lateral motion of the tibia on the thigh-bone, though freer than usual, was yet so very limited, that there was no reason to conclude the lateral ligaments were injured.

No feverishness, no heat, no redness, no discoloration, no swelling followed the injury. Only very slight effusion within the knee-joint occurred, but this to such a limited extent as scarcely to cause floating of the patella when the limb was straightened.

As I could find no case of a similar injury on record, to guide me as to the position in which the limb ought to be confined, I resolved to fix it in a nearly, but not quite, straight position,—just so slightly bent as to allow the flexors of the leg to have a slight advantage over the strong extensors attached to the patella. This position was adopted;—*first*, from the belief (founded on the observed non-healing of the round ligament of the head of the femur after its rupture) that the ruptured crucial ligament would not heal; *secondly*, from the belief that if the knee-joint were confined, as most likely it would be, for months to a bent position, the flexor muscles and their tendons would become so contracted as ever after to prevent the leg being extended, or made useful for progression; and, *thirdly*, from the conviction, that the very slight flexion at the knee was necessary to secure hereafter a tolerably useful leg, should it ever again become serviceable, by allowing the flexors a slight advantage over the extensors,—as upon the flexors was now to be thrown the additional duty of preventing the knee bending backwards, when the leg was straightened during walking.

A strong flat steel spring, 14 inches long, with a slight curvature, was therefore softly padded and bound to the back of the knee-joint, half of its length projecting down the back of the leg, half extending along the back of the thigh. The foot and leg, to above the knee, were then bandaged moderately tight, merely with the view of preventing any stoppage to the circulation from the pressure at the knee; and the patient, after a week's confinement to bed, was allowed to trail about the house on crutches.

At the end of a week from the date of the injury, the heavy wearied feeling in the knee had increased, and slight uneasiness was experienced on pressing into the hollow of the ham. This uneasiness was greatly increased by even the slightest attempt to put the foot to the ground, and the patient felt he had not the slightest command over the knee-joint.

Three months elapsed, and the patient had little more command over the knee than on the day of the injury. During that period, he had tried warm and cold fomentations, frictions with stimulant and other embrocations, various ointments, oil, &c., still with little improvement.

About a month after the injury, the bandages were discontinued, and their place supplied by a finely fitting laced stocking, made of Saxony broad cloth, and the broad flat steel spring was sewed to the back of it. I may here remark that, after a fair trial of the elastic and other stockings and bandages, I have come to the conclusion that the laced stocking made of Saxony broad cloth, with all the seams on the outside, is superior to any yet invented, for affording regulated pressure over the leg, combined with a certain degree of elasticity.

By the end of the fourth month, the patient was able to let the heel rest gently on the ground, but could not bear the weight of the body on the leg.

Five complete months elapsed before the patient could dispense with the use of crutches, and trust to the aid of a stick. By this time, he could nearly rest the weight of the body on the injured leg, when supported by its laced stocking, bandage and spring, but he still felt he had no command over the knee-joint. During progression, the knee was kept immoveable, and the motion was limited to the ankle and hip-joints, the weight of the body being thrown on the stick. Even at this period, the leg, if attempted to be straightened, had the tendency *to bend forwards* on the thigh, so that the spring could not be dispensed with; and more than thirteen months elapsed before its use could be discontinued.

Even at the end of eighteen months from the date of the injury, the knee remained weak, and could not be thoroughly straightened without causing a disagreeable sensation, as if the knee were to bend backwards; and still required to be supported by the laced stocking or by a stout knee-cap of chamois leather.

The patient, from this date, gradually acquired power over the knee-joint, and he can now run and walk with any man. But even yet, though eleven years from the date of the injury, the knee always feels unsteady, with a slight tendency to uneasiness in the ham, when straightened to the utmost it is capable of, or after a severe day's fatigue; and in walking, the foot is so put to the ground as to give the flexors a slight advantage over the extensors of the leg, though scarcely any one would notice that the knee-joint was not as straight as in other men.

The second case was as follows:—

Mrs H., in coming down from Stirling by the steamboat, on the 18th of August 1841, stumbled when on board, and the left foot getting at the moment wedged behind a trunk, she was thrown forwards across the trunk, and felt something give way with a snap in the left knee. When raised, she found she had lost all command over the left leg; and when the steamboat arrived at Trinity, she had to be carried out of it and sent home in a cab. I saw her the same evening, shortly after her arrival.

The bones of the leg and thigh were uninjured. There was a slight abrasion of the skin, with ecchymosis on the front of the tibia, about four inches below the patella, where the front of the leg had come in contact with the edge of the trunk. The *tendo Achillis*, and all the tendons forming the outer and inner hamstrings, appeared to be sound. There was no swelling, or redness, or pain in the knee-joint, only a kind of wearied sensation, and the most perfect loss of power, in so far as standing was concerned. When she sat on the chair, she could throw the leg forward or backwards; but when the the leg was extended, it was found *that there was nothing to oppose the knee-joint bending backwards*, in other words, *the leg could be bent forwards on the thigh* to a certain extent. When she was seated on the floor, and the leg stretched straight out, the slightest pressure on the patella caused the foot and leg to be tilted forwards, showing clearly that the structure which prevented the knee from being bent forwards beyond the straight line, was destroyed,—showing that the crucial ligament had been ruptured.

It seems unnecessary to enter into the particulars of the treatment of this case, seeing they were almost identical with those of that first narrated. This woman, however, recovered the use of the leg more speedily than the first patient. This, perhaps, resulted from her possessing a more vigorous constitution, from her being obliged to make earlier and freer use of the limb, and from her keeping the limb always more bent. She used a crutch only three-months and one week, trusting to the support of a stick afterwards. She gave up the use of the flat steel support at the end of nine months, but still required to support the knee with a chamois leather knee-cap eighteen months after the accident. At this period I lost sight of her, but when last I examined the knee it was somewhat bent, and, from the contraction of the extensor tendons, the leg could not be brought into a straight line with the thigh.

These cases appear to possess considerable interest for two reasons:—*First*, from their rarity, as I am not aware of any similar cases being on record; *Secondly*, from their proving that the rupture of this most important mechanism of the largest joint of the body may be perfectly recovered from, so as after a while to allow as free use of the limb as before the accident.

I am not aware it has ever been shown that the round ligaments of a joint, when once ruptured, ever heal. The crucial ligaments are, anatomically and physiologically speaking, round ligaments, only they are of much greater importance to the joint in which they exist than the round ligaments are to the joints in which they occur, as, without them, the knee-joint would be utterly useless.

The lateral and capsular ligaments of the knee-joint may be cut across, but if the crucial ligaments are left entire, the joint still preserves its character of a ginglymus joint. If the crucial ligaments, however, be cut, there is nothing to prevent the joint being bent to a certain extent in every direction, more especially backwards and forwards.

The fair inference from all this is that, in the above cases, the cure must have been finally effected by a reunion taking place between the extremities of the ruptured crucial ligament. The *fact* of union having taken place, cannot, of course, be demonstrated during life; but in so far as any conclusion can be drawn from the physical characters of the joint, it seems highly probable that union must have occurred. In no other way could we account for the perfect freedom of motion which the first narrated case exhibits, and the perfect straightening of the limb without the tendency of the knee to bend backwards. The practice which this patient has in walking, of keeping the knee very slightly bent,—so slight that no ordinary observer would notice it,—probably resulted from the habit he acquired when recovering from the injury, and the fear of a similar accident resulting from an accidental stumble.

ART. III.—*Memoir on the Treatment of Strumous Disorders by means of Preparations of Leaves of Walnut.* By Dr NEGRIER, Physician at Angers. (Archives Generales de Medecine, 4ieme serie, T. xxii. February 1850. P. 173.)

Dr NEGRIER published two memoirs,—the first in 1841, the second in 1844,—on the employment of preparations of walnut-leaves in the treatment of Strumous Disorders. The memoirs consisted exclusively of practical facts, without mixture of any theoretical view, either on the intimate nature of the disease, or on the specific properties of the remedy and its mode of action upon the economy. The intention of the author was then, as it is at present, to give sufficient publicity to an excellent means of curing one of the most severe maladies of the animal body. The experience of five years, and that of several foreign physicians, have given corroboration to the facts which the author then advanced. The principal object of this third memoir is to make further known in France the labours of those practitioners of whose knowledge and medical probity, well known in science, it is impossible to have any doubt; and, in order to adhere to the resolution laid down in the first memoir, of detailing only facts, and recording palpable truths, he is desirous to avoid everything beyond a simple statement of facts, and the inferences which directly may be deduced from them.

Since that time, Professor Nasse, Clinical Physician at Bonn, has published a memoir in which he gives the result of more tha one hundred instances. The author of that paper, which contain merely bare narratives, wishes to leave to readers the utmost liberty as to the estimation of the nature of the affection or affections denominated strumous.

It seems necessary to give an abstract of the two papers by M. Negrier.

When M. Negrier thought first of administering the leaves of the walnut-tree internally, he believed that he was the first person who had tried this method of treatment; and this persuasion contributed not a little to excite and sustain his zeal in the cause. He had not read the monography of M. Baudelocque, or the letter of M. Borson de Chambery. The work of M. Lepelletier, the Dictionaries and Journals of Medicine, were the sources in which he sought for information on the medicinal action of the leaves of the walnut-tree. The internal use of walnut-tree leaves is mentioned by no pharmacopœia, except that of Lemery, 1748, who states that the leaves and flowers of the walnut-tree are astringent, sudorific, and fitted, when taken in decoction, to oppose the malignity of the fluids. Under the article Nut (*Noix*) in the Dictionnaire de Medecine, M. Richard is satisfied with saying, "Nevertheless, at present, this medicine is scarcely employed, though its action is sufficiently energetic." He was not aware that Jurine of Geneva, as mentioned by M. Borson, had employed the walnut-leaves in the treatment of scrofulous disorders. In short, M. Negrier was without guide when he administered the extract of walnut-leaves, and studied its action on the economy. He had for some time employed decoctions of walnut-leaves in the form of lotion for scrofulous ulcers and for white swellings of the articulations, following the example of M. Mirault, whose contemporaries, the surgeons at Angers, also employed this topical application with some advantage.

In 1834, when M. Chevreul delegated to M. Negrier his duty at the General Hospital, which contains the foundling children, he found many of these unfortunate creatures labouring under scrofulous disorders. Some, in the last stage of the disease, were threatened with death; in others, whose disorders had undergone alleviation every year during the warm weather, the disease annually re-appeared, and, in like manner, threatened a fatal issue. All were treated only by bitters called antiscrofulous; for instance, decoctions of hop, preparations of the root of gentian, and similar articles. Baryta, iron, and iodine were also administered. The sores were dressed sometimes with emollient topicals, sometimes with iodized ointments. The dormitories of the children ere healthy, well-aired, and well-lighted; and their food was sufficiently good.

The treatment established by his predecessor, M. Negrier continued till 1837, and without a greater degree of success than had been previously obtained; that is, the sores of some children were healed in the month of May, and opened again in November; and among the number of twenty children, scarcely one or two, arrived at the age of puberty, escaped the fatal consequences of the disease with which they had been affected from infancy.

Before subjecting the children of the hospital to the internal use of the walnut-tree leaves, M. Negrier had already employed the remedy with some patients in private practice; and he had effected a very remarkable degree of amelioration in their condition. He resolved to apply the treatment generally, at the same time, to all the patients in the hospital, whatever was the form of the scrofulous disorder, and the degree of sanability which it presented.

The scrofulous children were at that time seventeen in number. Nine of these were labouring under osseous swellings, with caries; seven had strumous glands in a state of ulceration; one only, affected less severely, presented round the neck numerous glandular swellings not ulcerated; and he was also labouring under scrofulous ophthalmia in both eyes, already far advanced.

Each patient took daily two or three cupfuls of an infusion of the fresh leaves of walnut-tree, sweetened with simple syrup or honey. Each child took also, morning and evening, one pill of extract of walnut-tree leaves, weighing twenty centigrammes, or one spoonful of a syrup prepared with the same extract. All the sores were washed with a strong decoction of the same leaf, and covered either with compresses or with charpée soaked in this decoction, or with poultices of linseed meal and water of the walnut-tree leaves. The alimentary regimen, consisting of a meal of animal food daily, remained the same; the clothing remained also the same; the children slept in their common dormitories.

The treatment was commenced with the fine weather. This was the 20th June 1837.

The first signs of the action of this mode of treatment were evinced at the end of ten days only. The Sisters of the establishment, entrusted with the duty of carrying the treatment into effect, observed that the little patients were more cheerful and more playful. Their appetite was considerably increased. The first effects were nearly general. None of the children complained of bad digestion, of colic pains, or of internal heat. In none were the alvine discharges more frequent.

The influence of the treatment appeared at the same time on the sores in a very evident and favourable manner. M. Negrier satisfied himself that their cicatrization was more speedy than under the previous methods of management. The granulations assumed a degree of firmness and red coloration, which denoted a more active form of vital energy. Afterwards he convinced himself that the cicatrices were solid, and that the benefit obtained at the time was a genuine cure.

The forms of scrofulous disease were the following:—

Ophthalmia and strumous glands not ulcerated	1
Glandular tumours in a state of suppuration	7
Affections of the bones with fistulous ulcers	9
	17

In most of these children the disease had continued for at least two years; in some its duration extended to six, eight, and even ten years. After two months' treatment, in three, cures were completed; in ten, amelioration was sensible; and of four, the condition was stationary.

On the first of January 1838, after six months of administration of the walnut-tree leaves, the complete cures amounted to seven, including the three already mentioned; in five the amelioration was considerable; two were unimproved; two had died, one girl with acute encephalitis, another with tubercular phthisis; and in one, after cicatrization of the existing ulcers, a relapse had taken place.

Upon the first of January 1839, after treatment for eighteen months, the complete cures had arisen to ten; three were on the eve of being completely cured, and two were without any favourable change. Of these last patients, one died in 1839 of tubercular consumption.

From the facts now given, it results that, of fourteen children alive in 1839, twelve were cured, or on the eve of being cured. One only was not. The history of this young person shows the severe and inveterate character of his disease, and proves that, if amelioration has not taken place in the disease of the knee-joint, under which he was labouring, his general health and strength have been greatly amended under the administration of the preparations of walnut-tree leaves. After being subjected to treatment, by means of cod liver oil, for eight months, this patient is now nearly completely cured, though with ankylosis of the knee-joint.

The number of cases in which this mode of treatment was tried, subsequently amounted to fifty-six, which the author distinguishes into four categories. The first comprehends the strumous or glandular enlargements without ulceration; the second, the cases of scrofulous ophthalmia; the third includes the strumous swellings with sores; and the fourth consists of scrofulous necrosis and caries of the bones, with fistulous openings.

Under the first head, 10 cases occurred, and are given in sufficient detail. Treatment was commenced in some in 1837, in others in the summer of 1840. The former recovered in 1838, and the latter appear to have been restored before the end of 1840.

The general observations of M. Negrier are to the following effect.

Glandular cervical swellings generally advance slowly. Formed at first of several portions or kernels, these coalesce and approach each other as they increase in volume, and the mass forms then a tumour more or less ovoidal. When these tumours begin to undergo resolution, the glands are more exactly defined, and are separated by furrows. They become moveable beneath the skin in proportion as resolution proceeds, and finally disappear, sometimes completely.

The mass of the glands of the sub-auricular fossæ acquire always the bulk of a hen's egg, and do not exceed this size. They then remain stationary for several years without causing disorder in the general health. In certain cases, all the numerous glands which surround the neck are swelled at once, in consequence of which the neck becomes as large as the head, which appears as if chased or set in the former, while it cannot effect any movement of elevation or rotation. But strumous swellings are rarely so considerable unless the integuments are altered.

The skin which covers glandular swellings does not adhere to them; neither does it change its colour. Direct pressure on these tumours, if it be made on a surface of some breadth, is not painful; but when pressure is made laterally, pain is sensible, and is sooner felt.

This degree of insensibility in glandular swellings, and the small amount of constraint which they cause, explain the usual indifference of patients who are affected by them. When they are determined to try some sort of treatment, which can act only very slowly, they are soon wearied, and abandon the use of remedies from which they observe no immediate effects.

[Practical physicians in this country will not readily confirm the statement now made regarding the uniform indolence or painless character of glandular swellings. The truth is, that, though when they advance slowly these swellings may be void of pain, yet in other instances they are the seat of pain. It is further matter of observation, that, though often at first unattended by pain, yet, as enlargement advances, they give rise to painful sensations, and also do not bear pressure so easily as M. Negrier represents. It is further not altogether the fact, that the skin is colourless over these swellings. Often it begins to be red, and, very generally, when suppuration takes place, it is red to some extent previous to the formation and discharge of matter. If it be argued that these are not genuine scrofulous glands, that is, glands affected by tubercular deposit, it must be answered, that it is not, in all instances, possible to distinguish glands containing tubercular deposit from those affected by simple enlargement.

The truth appears to be that, under the influence of the strumous diathesis, glands are liable to at least two forms of enlargement; one which may be considered as the effect of ordinary inflammatory or hyperæmic congestion in the strumous; and one which is the effect of infiltration of tubercular matter. The first of these may cause, and does cause, the second; and the second is often accompanied by, or terminates in, the first. In chronic hyperæmic enlargement of the conglobate glands, though pain may not be felt at first, yet, as the enlargement proceeds, it is felt, and sometimes acutely. As the glandular enlargement proceeds, the subcutaneous cellular tissue is affected, then the skin; and in these circumstances pain is felt, the skin is hot and slightly red, and if resolution be not effected, suppuration takes place. All this may take place in the strumous without the deposit of tubercular matter in a distinct form. When tubercular matter is infiltrated or deposited, it often irritates the glands or the surrounding cellular tissue so much, that vascular congestion is set up, more or less pain is produced, the skin is in like manner slightly reddened, and a subcutaneous abscess is formed, which in no long time becomes the channel for deeper communications, and by which tubercular matter may be discharged. Considerable pain is often felt in those glands in this condition; and all careful observers will testify to the fact that the skin is sometimes reddened and assumes a brownish red hue.]

The topical remedies which seemed most suitable to resolve rapidly glandular swellings of long standing, when employed exclusively, he thinks, possess rarely any efficacy, because it is seldom that these swellings do not proceed from a general state of the constitution as their predisposing cause.

The author accordingly abstains in almost all instances from the application of topical remedies; and if he has in some instances recommended friction of tumours in the neck with medicinal ointments, or caused them to be simply covered with poultices of walnut-tree leaves, he allows that he erroneously followed a routine practice; and that he very rarely obtained from the practice a favourable effect which might determine the softening and suppuration of the tumour. At the date of the first paper, 1841, he confined his cases in this respect to causing the neck to be covered by a silk handkerchief or a collar of fur.

Topical applications employed in this manner, in order to obtain the resolution of indurated glands, which resist general treatment, produce then an effect analogous to that which results from the impression of sudden cold, which so often causes a relapse, by exciting new swelling of the parts. The new swelling does not, in that case remain indolent. Inflammation in it is developed very generally, and the indurated kernel, which seemed to form the gland, perhaps contributes to form this morbid process; for sometimes it is seen like a morbid body expelled, surrounded by purulent matter, after the manner of the core of a boil.

It was a thought of M. Negrier that he could act on the obstinate glandular kernels without producing inflammation of the surrounding tissue, by perforating these bodies by means of acupuncture needles. This small operation he tried only once; and, if he was not deceived, he effected, by its means, more complete resolution of the gland. This practice he proposes to repeat as soon as occasion shall occur.

In forming an estimate of the internal treatment of glandular swellings by means of preparations of walnut-tree leaves, according to the facts ascertained, he has no doubt that the remedy had a very manifest action in all the instances; that this treatment cured completely three patients in nine; and he adds, that in one of these cures all use of the medicine was given up after the lapse of one month. In four of the patients the tumours were diminished from one-half to two-thirds of their size, in a space of time from six weeks to three months. Three times the glands were reduced to little hard kernels, which continued obstinate under prolonged treatment. One of the cured patients, and two others whose condition was greatly amended, underwent a relapse, the manifest cause of which was, the impression of keen and sudden cold.

In general, the treatment of glandular enlargements was lengthened; and he seldom saw the tumours lose much of their volume before fifty days of administration of the remedies. Their action is greatly more speedy upon swellings which have proceeded to suppuration.

The treatment by means of preparations of walnut-tree leaves, as well as the remedies in ordinary use, was always more efficient during the months of summer. During winter, medicine often does little more than maintain the general health, and prevent the aggravation of the disease. This remark, however, is applicable only to swellings without ulcerations; for sores he has often seen cicatrized during the cold season under the influence of this treatment.

Almost all the individuals who made use of preparations of walnut-tree leaves gained flesh and strength, and appetite was promptly increased. The remark of the Hospital Sisters upon the greater degree of playfulness which is quickly evinced by children subjected to the treatment, is nearly constant. This liveliness is the first symptom of returning health; but all these favourable signs do not appear in subjects in whom the lungs are tuberculated, or those in whom phthisis is far advanced; they become emaciated, but are not attacked with colliquative diarrhœa until a greatly later period of the disease, or they do not present this symptom at all. The cough in these patients, instead of being increased by the syrup of walnut-tree leaves, appears, on the other hand, to be less frequent and less painful.

All the children took, without repugnance, the infusions of walnut-tree leaves, with sugar or honey. The syrup is always eagerly requested. The pills, enveloped in honey, or only put in a spoonful of sugared water, are swallowed without difficulty. This is not the case with ptisans of hop, or syrups of gentian and other bitter herbs.

The preparations of walnut-tree leaves, which shall be afterwards described in detail, are so harmless, that several patients at the hospital have used it almost constantly for three successive years, either in the form of syrup or in that of pills. The alvine discharges in the patients subjected to this treatment are increased in frequency; they acquire a brown colour. The use of honey, he thinks, obviates constipation, and on this account is preferable to sugar for edulcorating the infusion.

He gives two cases, showing the beneficial effects of walnut-tree leaves in chlorosis and amenorrhœa, one in a young woman of seventeen, the other in a female of twenty-four years. In the former case, the remedy was exhibited in infusion of the leaves; in the latter, in syrup of the leaves. In both cases, flannel undercoverings were ordered.

The second order of cases treated by preparations of walnut-tree leaves consists of instances of strumous ophthalmia affecting the conjunctivæ, the cornea, and the eyelids. Of these, four, which appear to have been severe and obstinate, are given. The remedy was given internally in the form of syrup and infusion, or pills with infusion of the leaves; and it was applied topically in the form of lotion or collyrium by means of a decoction of the walnut-tree leaves, to which was added some extract of belladonna and laudanum. It appears that all other usual remedies had been internally employed without good effect; and in two of the cases a seton had been inserted in the neck. In one case M. Negrier applied, after the treatment by walnut-leaves was commenced, a cautery on the cervical region; but whether actual or potential he mentions not.

The following inferences are deduced.

1. It deserves attention, that this treatment effected a cure in all the cases which were treated by it. Most commonly the amendment was rapid; that is, the amelioration was perfectly manifest after the first fifteen days of administration of the walnut-tree leaves.

2. The collyrium, consisting of walnut-leaf water and opium, displays here a very great and incontestible degree of efficacy. To the local application of the walnut-tree leaves must be ascribed the best part of the cure, since, in the ordinary methods of treatment, the simple lotions, strongly opiated, very rarely produced any benefit so quickly, and in these cases they had hitherto furnished no benefit.

3. The treatment by means of preparations of walnut-tree leaves had in general a more speedy action on the chronic inflammation of the eyes than upon the enlargement of the lymphatic glands.

None of the patients of this series had suffered any relapse at the date of the publication of the paper. (April 1841.)*

The third series consists of instances of scrofulous tumours in a state of ulceration. Under this head are given twenty cases in persons aged from eight to twenty-eight years, but the majority of whom were from eight or nine to fifteen years.

In these twenty instances the ulceration was the effect of inflammatory action, set up either in the strumous glands or in the surrounding cellular tissue. Some of the patients had been treated without success by well known physicians and in hospitals.

The treatment by means of walnut-leaves exerted an influence not less favourable upon this form of strumous disease than upon the preceding ones. Its action was in general more speedy upon glands in a state of ulceration than upon simple swellings. This was also the case, it has been stated, in the instances of ophthalmia.

Among twenty persons subjected to treatment, fourteen were completely and permanently cured; two of the children, whose condition was considerably amended, died of other disorders; the other five, although they were not cured, and their treatment must be yet protracted, are so many instances which concur also to prove the efficacy of the remedy, since these patients made great progress under the new method of treatment.

Most commonly, from two to six months were required to effect the cure in the case of strumous ulcerated tumours. In some of the cases, which the author designates as the most severe, the treatment was prolonged for two years, with some intermission of several weeks, from time to time. These obstinate cases are more rare when there is ulceration than when it is necessary to treat swellings of long standing, in which we have to suppose that there is infiltration of tubercular matter.

All the patients of this category have endured the general treatment not less easily than those of the previous ones.

With regard to topical applications, M. Negrier observed that slips of fine charpee, soaked in the decoction of walnut-tree leaves, possessed a much greater degree of efficacy than digestive ointments and poultices covered with the powder of walnut-tree leaves.

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* Archives Generales de Medecine, iii. Serie, T. x. Avril 1841.

In some instances M. Negrier caused the sores to be dressed with a digestive, consisting of equal parts of extract of walnut-tree leaves and turpentine. In other instances he directed the same extract to be mingled with fresh lard. These applications were spread upon paper or dressings. They exerted no remarkable action; but the dry powder of the walnut-tree leaves, sprinkled upon sores of bad appearance, speedily imparted new life to their surfaces, and florid granulations forthwith arose.

Notwithstanding these different dressings, M. Negrier was not less obliged to remove by the scissors, or destroy by potass, the elevated and attenuated margins of several sores. Often, also, he treated the granulations of sores with nitrate of silver, in order to modify and augment inflammatory action.

The dressings always were performed morning and evening. Slight compression, uniformly exerted on diseased parts, and a little heat maintained by some flannel coverings, were very useful. He has sometimes caused alkaline baths to be administered without apprehending any bad consequence from the sores being in contact with the water.

The children of the hospital,—and these have supplied the majority of the facts communicated in this memoir,—have in no respect changed their mode of living. They have had the same regimen throughout; one meal of animal food daily, and almost always soup and in the form of ragout; they have even the same clothing, and occupied the same dwelling,—a large hall, usually very cold in winter, but never moist. Instruction, in school classes, has been continued with all the patients who have been able to be present. Play, and games in the open air, even in winter, have not been forbidden.

It may thus be seen that, in several respects, the hygienic attentions might be amended; and this, M. Negrier has already effected. He requested that a particular apartment should be allotted to the strumous of each sex; that warm clothing should be distributed to them earlier in the winter, and withdrawn at a later period than in the case of other children; and that, to the patients affected with glandular swellings in the neck, woollen caps, with ear-pieces tying under the chin, should be given. He further requested that the meat assigned to these patients should be most frequently roasted, and that an allowance of red wine should be given them. These ameliorations in the regimen, he is of opinion, by exerting a favourable influence upon the health of the children, will abridge the length of the treatment and prevent the occurrence of relapses.

The fourth series consists of instances of scrofulous swelling of the bones, and scrofulous nekrosis and caries. Of these, nineteen instances are given.

The author has treated a much greater number of persons affected by scrofulous caries; and though he knows that in these patients a very manifest improvement has been effected, yet he does not include them in the present list, because they have not followed regularly the system of treatment.

The action of the treatment by means of preparations of walnut-tree leaves upon scrofulous caries, is very slow; but it is manifest, and at length efficacious, especially when the bones are not denuded of their periosteum to a great extent. For instance, in two cases (50, 52) were fistulous ulcers penetrating into an articulation, the bones of which were evidently altered, since osseous particles were expelled from both; yet both terminated in radical cure in the course of six months. The author expresses a doubt whether any other mode of treatment would have produced a result so favourable in similar circumstances.

The nineteen cases of this fourth series may be distinguished into two groups nearly equal in number. The first consists of these which present only affections of moderate severity; that is to say, those in which only the bones are attacked in the continuity of their bodies, or the articulations of the short bones of the feet and hands are affected. Of these the author numbers nine. In the second group are placed those diseases of the bones which form the large articulations. Of these there are ten.

Among the nine instances of the first set reported in numbers 37, 38, 39, 40, 45, 48, 50, 53, eight are instances of caries of bones of the feet and hands, and the ninth is an instance of nekrosis of the collar bone.

In the ten severe cases which form the second set, are four instances of caries of the bones of the feet, but belonging to the tibio-tarsal articulation; three of the bones of the elbow; two of caries of those of the knee; and lastly, one of the coxo-femoral articulation, with fistulous ulcers and complete luxation of the thigh-bone. To this series belonged the patients who died. Before being treated by preparations of walnut-tree, all these patients had been a long time under the ordinary methods, and, as has been seen, without avail.

Among the nineteen patients of this category, eight obtained as complete a cure as possible; and all remain well to this day (the date of the paper, June 1841). Among the other ten, two were temporarily cured, and they have relapsed. Four had already, at the time when the memoir was terminated, undergone a sufficient degree of amelioration to authorise the opinion that they will obtain a complete cure. The disease in three children obstinately resisted treatment; lastly, two patients died of tubercular phthisis.

In pursuing the examination of the results obtained in these two orders of patients, the author considers that all those of the first order excepting two were cured. Of the patients of the second order, the cures were in number four only at the time specified.

The shortest duration of the treatment in the whole series was six months; in this period of time, four cures were obtained. In the cases of six patients, it was requisite to continue the treatment from ten to eighteen months consecutively. Some of the children have continued the use of the medicine for twenty-six months without interuption. None of these patients have suffered from it any inconvenience; on the other hand, they have been enabled to endure, without inconvenience, the variable influences of the unfavourable season.

As in the treatment of the patients of the other categories, general saline baths, and baths with decoction of the leaves of the walnut-tree, sufficiently numerous, were salutary. In the first sort of baths the patients were immersed only when their sores were well covered; and the use of baths of walnut-tree water thus was not made a condition.

No advantage results from covering the diseased articulations with emollient poultices. These topical applications ought only to be used in the case of painful inflammation of the integuments, and at the time of relapses. As soon as the painful condition subsides, they ought to be discontinued.

Injections with decoction of walnut-tree leaves, in the cases of fistulous passages, are very useful. They modify the state of the ulcerated surfaces, and the suppuration speedily assumes the character of the condition which coincides with the formation of healthy granulations.

Some of the patients of the fourth series suffered relapses; the cures, at first cicatrized, passed rapidly into ulceration. This relapse has not uniformly been caused by cold. But whatever was the agent which determined this new inflammatory attack, it proceeded with rapidity, and suppuration speedily followed. This is, in other respects, a fact which is equally represented in the patients of the other categories.

In the thirty-second case,* the author expresses the opinion, that the general treatment was not the cause of this return of inflammation. It merely, by its exciting action, might favour the development of an independent attack. In the subject of the thirty-third instance, he is disposed to think that it is to the peculiar influence of the medicine that must be ascribed that sudden inflammation of all the glands in the neck, and partly also the circumstance that the patient was vigorous and of sanguine temperament. Though often, at the time of these relapses, M. Negrier continued the internal treatment by means of walnut-tree leaves, he allows that it is more eligible to refrain, under these circumstances, from its use, and to employ only antiphlogistic remedies, unless the subjects are greatly debilitated.

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* There is here, in the number given, some mistake. But we cannot undertake to correct it.

Two examples of a rare disease ascribed to the scrofulous diathesis are given. As these are peculiar, it may not be improper to subjoin abstracts of them.

Case 56. Mademoiselle L., 22 years of age, with white transparent skin, face marked with ephelides, hair black, menstruating sparingly and irregularly.

The left arm is twice the size of the right. The skin of it is rugous, chagrin-marked, and deeply furrowed, especially towards the elbows and the wrist. The wrist-joint appears as if it were luxated laterally in an incomplete manner. All the fingers are very much swelled and separated from each other.

Near the elbow and wrist are several fistulous sores, which are directed towards the articular extremities of the bones. The elbow is ankylosed; the wrist retains only limited movements of flexion; and the same is the case with the fingers. The bones of the phalanges of the thumb are carious. In short, the appearance of the arm recals that which elephantiasis may produce.

Mad. L. has laboured under this disease for seven years. She had pursued without advantage several forms of treatment, when M. Mirault, a colleague, sent her to M. Negrier.

The patient was subjected to treatment by means of preparations of walnut-tree leaves; syrup, infusions, baths of decoctions of the fresh leaves, regulated compression over the whole member by means of flannel bandages. In the course of three months, M. Negrier effected in the general health a greater degree of activity and energy. Appetite and strength returned, and menstruation became more regular and more abundant. In the arm he effected a diminution of more than five centimetres in its circumference. The sores were diminished in number and in extent. The patient then tried the effect of sea-bathing.

This gave her general health a greater degree of firmness. During the subsequent winter the patient continued the general treatment and the use of compression. The following season she returned to sea-bathing.

At the 27th of October 1840 Mademoiselle L. enjoyed good general health. The left arm was not larger than the right. The skin continues wrinkled and dry; and from time to time ensued an attack of erysipelatous inflammation, which, however, was not important. The articulations of the wrist and of the fingers have recovered a sufficient degree of mobility to allow this young person to follow needlework and embroidery.

Case 57. Louisa Belanger, aged 27 years, from Segré, menstruating since her fifteenth year; enjoyed good health to her thirteenth year. At that time she was attacked with considerable swelling of the left elbow, where an abscess was formed. At the age of seventeen the whole forearm partook in this strumous affection. At the age of twenty the radio-carpal articulation was attacked by the same disease, and several fistulous openings formed around the wrist. From this time the forearm and the arm became considerably enlarged; the bulk of the member was threefold its natural size. The two diseased articulations became ankylosed; that of the wrist was deformed; the hand was thrown out laterally towards the radius. The skin of the whole arm became wrinkled, furrowed with thick folds; it presented the aspect given by elephantiasis.

At the age of twenty-one, the right arm became the seat of an attack of lupus. At the age of twenty-five the thumb of the right hand was attacked; it was doubled in bulk, and all the articulations were fixed after long courses of suppuration, which carried away several fragments of the phalanges.

The patient was treated for a long time at Segré by M. Duval. She had spent fifteen successive months in the wards of the Hotel-Dieu at Angers, without any one of the methods of treatment to which she was subjected producing any sensible amelioration. In 1833 she took thirty sea-baths, which suspended the progress of the disease for some months. It then resumed its course.

On the 23d June 1840, the state of the patient was the following. Menstruation was regularly performed, but scantily at each period. The appetite was almost gone. The patient, who was very restless, had an accession of fever every night. The circumference of the elbow, measured at the point where this part was most enlarged, was one foot (325 millimetres); that of the wrist 284 millimetres.

The patient was subjected to treatment, by the preparations of walnut-tree leaves, on the 25th of June 1840. This consisted in four pills of the extract daily, with three glasses of infusion, and immersion of the arms in the bath of decoction of the leaves of walnut-tree, twice daily. Saline purgatives were administered every week. Regular compression was made by means of a flannel roller; the fingers were compressed separately.

On the third of October, after treatment for three months and ten days, the general health was good; menstruation more abundant. The circumference of the wrist was reduced five centimetres; it was only seven inches and a quarter in place of ten inches.

The size of the elbow was still more diminished; its circumference was not more than eight inches and a-half. The swelling of the cheek had extended towards the eye, but was diminishing in the opposite direction.

The treatment was suspended for fifteen days, and resumed in the same doses.

On the 5th of December 1840, the wrist had diminished two centimetres more. The size of the elbow remained the same. The general health is well preserved. For the pills, the syrup of walnut-tree leaves was substituted; of this, the patient took three spoonfuls daily.

M. Negrier deduces the following general conclusions:—

Fifty-six patients, affected with scrofulous disease, in different forms, were treated by means of preparations of the walnut-tree leaves.

In this number, thirty-one were cures, and did not afterwards disappoint expectations. Eighteen patients, without being completely cured, underwent a degree of amendment very remarkable in their condition; and the greatest number among them were in the course of being cured. Four patients have obtained no advantage from the use of the medicine, from the state of their sores. Among them was one who was remarkably strengthened (case 47), and who, at the time specified, seemed in the course of being cured, under the use of cod liver oil.

Four children died during treatment; but two were destroyed by tubercular phthisis, one by acute *enkephalitis*, and the fourth by double pneumonia.

The treatment, by the preparations of walnut-tree leaves, has furnished to him results, which he regards as sufficiently advantageous, in order to justify their serious examination, and warrant their being subjected to the control of systematic observation, particularly by hospital physicians, who have better means than others of administering the remedy accurately and in comparison with other agents.

Experience has satisfied him that the long-continued use of walnut-tree leaves has never caused, in the economy, any unpleasant effects. This medicine, which may be placed in the class of slightly-aromatic bitters, possesses an efficacy nearly uniform in scrofulous disorders.

The first effect of the preparations of walnut-tree leaves is to augment the activity of digestion and circulation; to all the functions they impart a remarkable degree of energy. A natural question is, whether they exert any special action upon the lymphatic system? The facts recorded by the author lead him to think that they do. Under the influence of their use, the muscles become more firm, the skin acquires a ruddy tint, and speedily parts with its chlorotic paleness. It may be a subject of inquiry whether the walnut-tree leaf contains any other principle than tannin, which is, doubtless, not foreign to the tonic action of this vegetable.

As to comparison between this and other received methods of treatment, the conditions in which most of the patients whose cases formed the subject of clinical observation were found, at the time of treatment, sufficiently prove, he maintains, that these different modes of management possessed no efficacy, when recourse was had to the preparation of walnut-tree leaves.

The preparations employed are the following.

The infusions of the walnut-tree leaves are made by placing a good amount (pinch) of these leaves, cut, into two hundred and fifty grammes of boiling water. This infusion is sweetened with sugar, or with the syrup to be presently noticed. M. Negrier prescribed from two to three cupfuls of this infusion daily; and as many as five may be given.

The decoction of the leaves, which acts advantageously in the form of lotions, and as a topical application, in which the pledgets for dressing the sores are immersed, ought to be more strongly charged than the infusion. M. Negrier uses a small handful of leaves to a kilogramme of water, and boiling is continued from ten to fifteen minutes. This preparation is also very useful in the form of baths both local and general. Its efficacy is particularly remarkable when used by injection into fistulous passages.

The extract is prepared with the walnut-tree leaves, by the method of displacement. By employing the dry leaves, the practitioner has in his power the means of renewing this preparation, as often as he requires, during all seasons; while, by using recent leaves, it is requisite to prepare it in too large quantity, and it is liable to undergo alteration.

The syrup of the leaves of walnut-tree is prepared with the extract by mingling forty centigrammes with thirty grammes of simple syrup. By this means the practitioner knows what are the doses of the medicine which he employs. The syrup may also be prepared with the green leaves; and it is then more aromatic than that which is compounded with the extract; but it is impossible in this case to form a correct estimate of the quantity of the medicine which the patient daily takes.

To young children he gives two or three teaspoonfuls of syrup in the course of twenty-four hours. The ordinary dose for adults is from thirty-two to forty grammes; and he has never gone beyond sixty-four grammes.

The pills of the extract of walnut-tree leaves are each twenty centigrammes of extract, rendered consistent by a sufficient amount of the powder of the leaves. Of these, two are taken daily; and he has never gone beyond four daily.

Lastly, In some cases, in which it may be useful to cause friction to be made upon the afflicted region, he employed an ointment composed of thirty grammes of extract of the leaves, forty grammes of lard, and fifteen centigrammes of essential oil of Bergamot. The frictions require to be made gently, and for about fifteen minutes twice daily.

It is easy to understand, he observes in conclusion, that, considering the nature of the disease, the salutary effects of treatment are sometimes slow in appearing. He therefore recommends perseverance; and he expresses the opinion that, if in the hands of some practitioners the preparations of walnut-tree leaves have been administered without efficacy, the reason is, that either the patient or the physician became too soon tired with using them. It is, in short, requisite to persevere, when it is remembered, that, in order to obtain a durable cure, the physician has not only to oppose the effects of the malady, but also to effect a thorough change in the constitution of the individual.*

In February 1844, M. Negrier published a second memoir on the treatment of scrofulous disorders by means of walnut-tree leaves. In this paper the author completed the history of those patients given in the first paper; and he added a list of persons treated by the remedy subsequent to the publication of the first memoir. Under the first head the following results are given.

Among the ten persons reported as cured of strumous swellings, not in a state of ulceration, at Angers or its vicinity, eight have continued cured. The state of the two subjects not found was unknown to the author in 1844.

Of the four persons labouring under scrofulous ophthalmia, one, it was formerly observed, died in 1839, after the ophthalmic disease was cured. The other three remained well and without relapse till 1844.

Under the third category, it may be mentioned, were given twenty cases. Among seventeen of these living in 1841, three died; one of tubercular phthisis in 1842; a second, in 1841, died in an attack of epilepsy; and a third died of the scrofulous disease in 1841. Among six persons in this category dead between 1837 and 1842, four died manifestly of pulmonary consumption. The two last were not examined; but M. Negrier is led to think that their case was the same, as, according to information which he procured, both coughed much and expectorated purulent matter.

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* Archives Generales, iiieme Serie, T. xi. Mai 1841. P. 41.

The cures obtained in the course of 1841, in this third series, amounted to fourteen; and the number has not been increased. All those who did not die of consumption and similar disorders, were cured. The number of favourable terminations, therefore, has augmented by three, as that of deaths has augmented by the same number.

The fourth series, consisting of swelling and scrofulous caries of the bones, comprehended nineteen cases, divided into two orders. In the month of April 1841, eight of the nineteen cases remained cured; all the others underwent a perceptible amendment in their condition.

Two of the persons referred to the second order died of pulmonary consumption. On the seventeen patients alive in 1841, he gives the following statements:—

1. 37.* C. N.—Disease of the first metatarsal bone of right foot; remains well at Paris.

2. 38. C. A.—Disease of first metatarsal bone of right foot; disorders have returned. The author supposes his state to be worse.

3. 39. J. M., aged fourteen.—Caries of second metatarsal bone of right foot and corresponding phalanx. Cured; no relapse.

4. 40. V. N., aged thirteen.—The two first metacarpal bones of the left hand. Health good for three years; a small fistulous passage on the back of the left hand; but the bones are not swelled. The cure is probably kept up by a partial nekrosis.

5. 41. C. H., aged eleven.—Not to be found.

6. 43. M. A., aged thirteen.—The left elbow joint greatly swelled and ankylosed. Continues cured. She resides in the Hospital of Incurables as a domestic servant.

7. 46. Euphrasia Lislavoie, aged sixteen.—Caries of the first phalanx of the great toe of the right foot. Continues well.

8. 47. P. Parthenaire, twenty years of age.—Disease of left knee joint, with fistulous openings. This patient was quite cured and walked without crutches, though the left knee joint was ankylosed. In 1841, he was found guilty of theft in the hospital, where he was pursuing his trade of tailor. He was in consequence condemned to imprisonment in the Bridewell of Fontevrault; and there he died, in 1842, of tubercular phthisis.

9. 48. M. Barthelmot, aged eight.—Strumous abscesses in the hands; strumous ophthalmia; a large abscess in the left thigh like lumbar ulcers. When this had discharged matter by several openings for some months, its source was made manifest by an angular curvature of the spine opposite to the twelfth dorsal vertebra in March 1842; and subsequently, 8th August 1843, by a fistulous passage in the loins communicating with the affected vertebra. These sores nevertheless healed up under the use of the walnut-tree leaves, so that in May 1843 she was comparatively well; and though with incurvated spine and ankylosed left elbow, she was able then to walk without assistance. She was likewise free from cough, which had at one time been threatening.

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* The second series of numbers indicates the cases as numbered in the first memoir.

The treatment in this case had been persevering and active. In April 1842, when the spine was giving way, the internal treatment by infusion of the leaves was particularly enforced; and external general treatment, by means of multiplied baths of decoction of the leaves, was not less actively carried into effect.

The author proposes it as a question, whether the apparent good state of the health in this case may be taken to indicate the completion of a cure?

10. 49. J. G., twenty-two years of age.—With former caries of the collar bone, was an instance of the perfect efficacy of the walnut-tree leaves. She was completely cured, and no relapse took place.

11. S. M., fourteen years of age.—Scrofulous swellings of the articulation of the right foot, with fistulous openings and expulsion of fragments of bone. This young woman was completely cured, though with ankylosis of the articulation of the foot and slight elevation of the heel.

12. 56. D., thirteen years of age.—Caries of the third metatarsal bone of the right foot, with expulsion of bony fragments in 1838. M. Negrier did not obtain information of this patient.

13. 52. L. Le S., twenty-two years of age.—Caries of the bones of the articulation of the right foot; sores in the neck and axilla; afterwards disease of the 7th, 8th, and 9th dorsal vertebrae; then, in 1841, indications of pulmonary phthisis. Caustic issues were employed against this disease of the vertebrae. The astragalus, it is stated, was completely discharged. The articulation of the foot became ankylosed. Recovery took place to so great a degree, that she could walk several hundred paces with the aid of one stick. In other respects, though plump and with good appetite, her voice was gone in 1844, and M. Negrier dreaded that consumption would close the scene.

14. 53. F. F., aged twelve years.—Disease of the bones of the right foot, with fistulous sores. Continued cured.

15. 54. J. Le P., aged nineteen.—Carious disease of arti-

culations of left foot, with some fistulous openings, and discharge of many fragments of bone. Cured without relapse. Continued well since 1840.

16. 55. Fremond, aged thirteen years.—Lateral curvature of the spine; ulcerated glands under the chin; disease of left collar bone with fistulous sore; disease of right hip-joint with fistulous opening, and complete luxation of the thigh-bone upwards and backwards. Some amendment. Treatment was not pursued. M. Negrier intimates that the persons to whom this patient is related acted in such manner that he cannot give expression to his opinion upon them.

17. 42 and 45. Ch. Fr., aged sixteen, and A. Delaunay, aged ten, both died of tubercular phthisis.

The number of persons cured in this series amounts to ten.

From the history and result of the cases 9 and 13, M. Negrier infers that much depends upon perseverance in the use of the remedy. Both of these cases were in the most hopeless condition; yet in both the patients attained a considerable amount of health and strength, under the continued and systematic employment of the remedy.

It is not common, the author observes, to see patients get well of vertebral caries, with abscess by congestion; and hence he thinks these cases deserve attention.

M. Negrier then states the new facts which his observation has furnished since 1841, in the same order as in the first memoir. It is unnecessary to give the details.

It appears that the strumous enlargement of the glands is most readily removed under the use of walnut-tree leaves.

Of scrofulous ophthalmia four examples are given; and a fifth is added from the practice of M. Reullié. All present the usual characters of red, swelled eyelids, inflamed conjunctiva, more or less opacity of the cornea, with intolerance of light, and impaired vision

It appears that M. Cunier had asserted in 1841, that the remedy recommended by M. Negrier was not more efficacious than many other remedies equally recommended, and afterwards abandoned as ineffectual and not answering to the characters assigned to them. To this M. Negrier replies, that it is very uncommon to obtain cures in cases of scrofulous ophthalmia, or even the cessation of the symptoms, in the short space of time, from fourteen to twenty-six days, in which he, M. N., has effected cures by means of the use of walnut-tree leaves, although setons united with hydrochlorate of baryta, as recommended by M. Payan, are employed.

In those instances which presented the usual characters of severe scrofulous ophthalmia, the remedies were the pills, the syrup, and the infusion of the extract, and externally the local application of decoction of walnut-tree leaves as an eye water. All the cases got well in spaces of time between one month and three. The fourth and fifth cases are very excellent.

The instances of ulcerated glands and affections of the bones are very similar to those given in the first memoir.

In final analysis of the whole facts, M. Negrier shows that, among the fifty-five first patients, most of them very formidable cases, thirty-four were radically cured; that among those which the author still considers as under treatment, six will probably be cured, and some will enlarge the number of deaths. As to the patients who form the subject of the second essay, he thinks that the results obtained have been generally more satisfactory, and more decidedly in favour of the treatment; for the patients severely affected to whom the remedy was administered were comparatively as numerous in the second list as in the first. Among the new cases, those of scrofulous ophthalmia were both severe and of old standing, and had hitherto resisted the ordinary treatment employed. The speedy cure of all these last patients confirms what he had previously stated regarding the peculiar efficacy of the preparations of walnut-tree leaves, in controlling a disorder which often causes the physician to despair.

Lastly, Among the five new cases of scrofulous *caries*, is one particularly deserving attention. This is the case of the young girl, Josephine Gidouin, thirteen years of age, in whom, besides enlarged glands of the neck, the left knee was affected with one of those forms of disease called white swelling, with ulceration and communications with the carious bone. After eight months of treatment with the walnut-tree leaves the swelling diminished, the fistulous openings healed, and the joint became ankylosed, with complete restoration of the general health. This young person, fifteen months subsequently, was able to walk without crutches; and though the knee-joint was stiff and covered with the traces of the fistulous openings, and the leg and thigh were thinner than those on the opposite side, the limb was serviceable and the health good; a result obtained, the author observes, without any other treatment except that of the walnut-tree leaves. This patient had been previously seen by a well-informed surgeon, who regarded amputation as the only resource.

The author gives the following inferences on the result of the observation of six years' experience upon the method of treatment.

1. Scrofulous disorders are in general radically cured by the use of preparations of walnut-tree leaves.

2. The action of this therapeutic agent possesses a sufficient degree of steadiness to enable the practitioner to reckon upon the cure of three-fourths of the patients treated by means of it.

3. The action of this mode of treatment is generally slow. It requires from twenty to fifty days, according to the nature of the symptoms, and the constitution of the subjects, in order that the effects be rendered sensible.

4. Patients cured by means of the preparations of walnut-tree leaves almost all retain the health which they have obtained under the influence of this treatment. Few relapses take place.

5. The effects produced by the internal use of the extract of walnut-tree leaves are at first general; the influence of this method of treatment is subsequently evinced upon the local symptoms.

6. In certain forms of scrofulous disorders, it is only after a long time that the efficacious action of this treament is observed. This remark is particularly applicable to strumous glands not in a state of ulceration.

7. The preparations of walnut-tree leaves exert, on the contrary, a sufficiently speedy action upon the sores and the fistulous openings, whether they are maintained or not by caries of the bones, excepting in persons of dry and nervous temperament.

8. Till the present time, the instances of strumous ophthalmia which M. Negrier has observed, have been certainly and more rapidly cured by this method of treatment than by any other.*

The results, which are given as conclusions at the end of the first memoir in page 285, the author considered then sufficiently important to entitle the treatment to serious examination, and to be subjected to the observation of hospital physicians, who are placed in more favourable positions than their brethren to cause the remedy to be administered with accuracy, and in comparison with other methods of treatment.

At this period of his inquiries, M. Negrier was satisfied that the preparations of walnut leaves, which had in no instance produced the slightest unpleasant effect on the economy, exerted on the other hand a favourable modification, by giving to all the functions, and especially to digestion and circulation, a remarkable and salutary energy.

In the period extending from 1837 to 1841, when the author had established the efficacy of the treatment by the preparations of walnut leaves, he had entirely abandoned every other method. Those even the most highly recommended, had failed so often, that he gave at that time no attention to the comparative effects of the new method of treatment.

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* Archives Generales, 4ieme Serie, T. iv. Fevrier, 1844. Pp. 133–158.

In the second memoir, which appeared, as has been shown, three years afterwards, Dr Negrier advanced several new facts; but his chief endeavour was to make a faithful report of the situation of the patients who formed the subject of the first memoir. It was important to know if the cures obtained, had been permanent, and whether, in several other respects, the first instances could be considered as facts acquired to science.

In deferring the publication of the second memoir to 1844, it was his hope that, during this lapse of time, physicians, anxious to promote the progress of the art of healing, would make observations for themselves, and would either corroborate the truth of the facts which he had adduced, or invalidate these facts by observations which it was easy for every one to follow. This has not been the case. No French physician, either in the interval which has elapsed between the publication of the two first memoirs, or since the year 1844, has announced that he has subjected the new treatment to trial. This has not been because the remedy has not been employed in the hospitals of several large towns, or in private practice. The employment of walnut-leaves has been adopted by a great number of distinguished practitioners; and at Paris, one of the physicians of one of the large hospitals has made the drug, it is stated, the basis of a mode of treatment, which he has appropriated to himself.

While the French physicians have adopted the new method of treatment, without making known the results which they have obtained, foreign physicians have more regularly answered to the appeal made to the profession by M. Negrier. Dr Nasse, professor of clinical medicine at the University of Bonn, published a memoir, which contains not fewer than 117 instances of scrofula, treated by walnut-leaves; a dissertation, highly estimated, was published on the same subject, at the same university, by Dr Kreutzwald, through the channel of the German journals of medicine; and, lastly, Dr Michele Borgiali of Yvrea, published, in the Journal of the Royal Society of Medicine at Turin, a memoir on the use of the remedy. These performances, Dr Negrier argues, show that this mode of treatment, examined by numerous facts and in different climates, upon subjects dissimilar in age and temperament, has earned entire approbation; that, compared by these practitioners with the methods of treatment by means of iodine, the salts of baryta, fish liver oil, and other agents, the preference has been assigned to it for the regularity and uniform character of its effects, and also for the permanency of the ameliorations produced, and the facility of administration.

The cases given by M. Nasse present this happy circumstance for forming a comparative estimate of the merits of the method, that almost all the patients whom he has treated had been subjected, without advantage, to the use of the fish liver oil, a method which has a tendency to become generalised, while it causes the preparations of walnut-leaves to be forgotten. The following is an abstract of the memoir of Dr Nasse.

During the last few years different persons have greatly extolled certain new means for assisting in the cure of diseases. These we have tried in our clinical establishment, against affections hitherto obstinate. Some have not answered to the praises which have been conferred upon them; but, after many experimental trials, which have been made to command our confidence, the leaf of the walnut-tree, which M. Negrier has recommended as a means of curing scrofula, has appeared to us to be very deserving of the recommendation. Subsequent to the year 1841, when the memoir of M. Negrier appeared, the Journal of Correspondence of the Physicians of the Rhine and Westphalia, published, after a preliminary notice (Number 6, page 103), a dissertation defended in the University of Bonn by M. J. Kreutzwald; *de Utilitate foliorum Juglandis Regiæ ad curandam Scrophulosin.* This dissertation served as a text to a note published by many German Journals, upon the efficacy of the new treatment pursued at Bonn. Then from all parts were addressed, to the author of the dissertation and to myself, requests to know the mode in which the leaves of the walnut-tree were employed. The translation into the German language of the Memoir of M. Negrier, appeared to me to form the best answer to the questions. Dr Kreutzwald added some experiments made by himself and his friends upon the efficacy of the remedy recommended. They are calculated to show the therapeutic value of the remedy for which we are indebted to Dr Negrier. Dated Bonn, October 1842.

This preface is followed by the translation of the first memoir of M. Negrier, and a supplement of cases derived from Dr Kreutzwald. These cases are ten in number.

Cases taken from the Memoir of M. Kreutzwald.

Case 1. Maurice Reisinger, orphan, is six years of age. His father and his grandmother suffered continually from disorders of the eyes; his only sister has on the neck a number of swelled glands. This boy has suffered for several years under scrofulous inflammation of the eyes, which was greatly aggravated last spring, at which period the patient was attacked by catarrhal fever. Ethiops mineral, and iodine were employed as remedies; then for a long time fish liver oil (the oil of the sea dog or of the whale), and as a topical application sugar of lead and borax; then frictions with tartarized antimony on the nape of the neck. The use of all these means was followed by no decisive result; the eyes were sometimes better, sometimes worse. The state of the patient at the beginning of November 1841 was the following.

The child is of feeble, delicate constitution; little grown. He presents all the external symptoms of strumous persons; the figure pale, flabby; the physiognomy little intelligent. He has strumous inflammation of the eyes, more considerable in the right eye, where it is accompanied with excessive photophobia, which increases, especially in the morning, to such a degree, that exposure to a weak light causes then acute pain; the tears which flow incessantly irritate the eyes and render them red; the two eyelids are red and swelled, and their margin is covered with a thick crust; the opening of the eyelids is greatly contracted, and the patient winks; upon the cornea of the left eye is seen the mark of a former cicatrix. The nose runs incessantly; the labial groove is red and swelled; all the upper lip and the *alae nasi* are swollen. On the neck are many enlarged glands, from the size of a pea to that of nut; they are hard, but not the seat of pain, when pressed, and show little through the skin, which retains its natural colour. The abdomen is tense; and there are felt in it, through the epigastrium, hard knotty lumps removed from each other. The appetite is good; the child has a desire for black bread and leguminous grains. The alvine discharges are regular.

On the 11th of November, the patient, who had long been given up by the physicians, was placed on the use of the walnut-leaves in the form of ptisan and pills of extract, and powder of these leaves (thirty grains of extract to form sixty pills), of which he took two, three times daily. The domestic cares were reasonably good; the food was of sufficiently good quality.

On the 8th of December, at the end of thirty days, the state of the patient was remarkably improved. The eyes were no longer hurt by exposure to light; the crusts began to fall of; the redness of the skin had disappeared; the tears were less abundant and less acrid, so that the eyes were no longer red. After two months of regular use of this remedy, in the middle of January, when the treatment had to be stopped, the leaves of the walnut then being no longer obtainable, the following was the state of the patient. He was in good spirits; a light not too strong did not hurt the eyes; the nasal discharge had ceased; the crusts of the skin had disappeared; those of the eyelids had dropped off, and the colour of their margins was in its normal state. The upper lip had nearly recovered its natural shape and colour. The size and number of glandular swellings in the neck had remarkably diminished. The belly was less tense and more soft.

The remedy was given up. This treatment for two months and a half produced so beneficial an effect, that very soon the child was delivered from all the symptoms of his disorder. His health established, continued good at the time of the report, October 1842.

Case 2. Elizabeth Greninger, aged three years, of delicate constitution, suffered for a long time under a disease in both cheeks, and leucorrhœal discharge, which very probably depended on scrofula. The light was painful to the eyes; the eyelids and conjunctivæ were red; on the corneæ of both eyes were seen marks of former cicatrices. The eyes and nostrils discharged greatly. The upper lip was much swelled, the belly swelled and hard. The discharge from the vagina was so acrid, that it caused ulceration of the sexual parts and the inner surface of the thighs, which rendered walking difficult. The appetite was good, and the alvine evacuations regular. Hitherto the patient had for a long time taken internally fish liver oil, and externally astringent baths had been employed against the vaginal discharge. These measures had been without effect.

On the 6th of November 1841, the treatment by means of walnut-leaves was commenced. Twelve grains of extract were mixed in one ounce of water and the same quantity of simple syrup; and of this mixture the patient took three times daily one spoonful in coffee. For the vaginal discharge there was employed very regularly a decoction of two drachms of walnut-leaves in six ounces of water as lotion and injection.

Very soon favourable changes were observed. On the 26th of November the leucorrhœal discharge had entirely disappeared, and at the same time the state of the eyes had been greatly improved; their redness was much diminished; the intolerance of light was so much less, that the patient could endure a pretty bright light. The same amendment had taken place in all the external signs of the disease.

On the 30th of November it was requisite to interrupt the treatment, in consequence of a catarrhal fever, which had attacked the patient. Tartrate of antimony in minute doses, and lime-tree decoction, were ordered. After some days the fever had almost disappeared, when the presence of intestinal worms was recognised. An electuary of seeds of zedoary, with juice of rape, caused the expulsion of a great number of these worms.

On the 14th of December, the treatment by means of walnut-tree leaves was resumed. Though during the interval of suspension of treatment the eyes had again become ill, the use of the remedies for some days restored them to their previous improved state.

Towards the middle of the month of January 1842, the patient was in all respects a great deal better, when the treatment was interrupted in consequence of the deficiency of the walnut-tree leaves.

Case 3. Catharine Greninger, three years of age, endowed with much intelligence, though with feeble and delicate constitution. The skin is fine and transparent, the cheeks rosy, the hair fair, the eyes blue. This patient, who in 1840 had suffered from a prolonged attack of bronchitis, had laboured long under considerable leucorrhœa, the acrimony of which discharge injured the sexual and neighbouring parts, and caused much suffering. Hitherto she had taken the fish liver oil; and for the discharge astringents had been employed. These measures had been without good result.

On the 8th of November was commenced the treatment by means of walnut-tree leaves. On the 12th of the same month, the discharge was more copious and less acrid. On the 20th, all the sufferings of the patient had disappeared. The patient was at the date of the dissertation well. The use of the remedy was continued as a preservative until the middle of January.

Case 4. Mary Ann Greninger, six years of age, of feeble constitution, under-grown, was affected for a long time with an extensive eruption on the head (*porrigo maculata*), and a vaginal discharge. As among the other children, the state of the sexual organs and of the neighbouring skin was the same as to coloration, swelling, and pain. The patient had on the neck many swelled glands. The appetite was good. She preferred farinaceous matters. The alvine discharges were regular.

The remedies employed up to this time had produced no amendment. The leaves of the walnut-tree were employed as in the preceding cases. At the end of four weeks favourable changes were observed. The vaginal discharge was diminished in amount and less acrid; the eruption on the head was also abated. The patient had at first taken fish liver oil without good effect. After she had continued, like her sisters, the treatment by means of walnut-tree leaves for the space of two months, she was completely cured of her disorder.

Case 5. Henry Ostern, six years of age, was suffering under a profuse scrofulous discharge from the right ear; the skin of the external part of the external meatus was red and swelled, in some parts ulcerated. On the chin were many ulcerations, covered with brown crusts. Hitherto cod liver oil had been employed without good effect.

On the 21st December 1841 was commenced the treatment with walnut-tree leaves; and after the use for about one month of the extract of the leaves, the discharge from the ear had disappeared, the crusts on the chin dropped off, and the ulcerations being healed, the skin of the ear had recovered its natural appearance. This child kept the health in its established, for to the date of the publication (6th October 1842).

Case 6. Francis Morgan, aged two years and eight months, is of stature disproportioned to his age, and is deaf. The head is large; the person bloated; the eyes are surrounded with large bluish circles; the *alæ nasi* are thick and directed outwards. From the nostrils flowed a white acrid matter, which had ulcerated the inner nasal surface and the upper lip, which last part was the thickness of one inch. On the neck was a number of hardened glands, which, without being painful on being touched, were nevertheless very apparent. The belly was protuberant and hard; a great number of small hardened glands could be felt through the abdominal parietes, towards the middle of the abdomen, the outline of which was before taking food fifty-three inches, and a few moments after taking food fifty-five inches. The child perspired much during the night; and the breathing was embarrassed. He was affected alternately with diarrhœa and obstinate constipation of the bowels. The appetite was great; he preferred brown bread and potatoes. Cod liver oil had hitherto been employed without benefit.

On the 6th of November 1841, treatment by means of walnut-tree leaves was commenced. At the end of eight days, the diarrhœa stopped; the alvine discharges becoming natural; the nasal discharge diminished; the redness and the large size of the upper lip diminished; the belly became less protuberant, and was softer; in short, in all respects the condition of the patient was ameliorated.

Towards the middle of January 1842, when the want of walnut-tree leaves rendered it necessary to stop the treatment, the patient might be considered as completely cured. The puffy swelling had disappeared; the upper lip and the *septum narium* were almost in their natural state; the glands of the neck had diminished in number and size. The circumference of the belly before taking food was only forty-seven inches; the abdomen was soft; the mesenteric swellings had entirely disappeared; the alvine discharges were regular; constant perspiration had ceased. Every circumstance denoted perceptible amendment.

Case 7. Apollonia Schmitz, aged two years, was the child of indigent parents. The brother and the sister of this patient, after labouring under suppuration of the mesenteric glands and tubercles by the lungs, had died. Like the subject of this case, their appearance was truly miserable.

The eyelids were red; the lacrymal glands were swelled; the nose and lips swelled. From time to time all the glands the neck were hard; and several had long been in a state of suppuration. The axillary and inguinal glands were in like manner swelled and indurated. From the ankles to the middle of the calves, extended swelled bands, which became painful upon motion. The belly was swollen, and within it were felt hard tumours. The patient had also leucorrhœa. The appetite was moderate.

To this time the patient had taken cod liver oil without good effect. At this date she began to take four times daily half-a-grain of extract of walnut-tree leaves, ascending gradually to the dose of three grains. At the end of the sixth week, the state of the patient was remarkably ameliorated. The swellings in the legs, the enlargement of the axillary and inguinal glands, completely disappeared. The child could move about without difficulty; the vaginal discharge and the disease of the eyelids had ceased. The glands in the neck, though swelled, had declined for the most, both in hardness and size; a great number of the sores on the neck were healed. The little girl, who had hitherto cried incessantly, spent much time in play.

After six weeks longer of treatment, by means of the leaves of the walnut-tree, during which she took ordinarily two douche baths, all the processes of digestion, the appetite, the movements were accomplished as in the state of perfect health. All the sores were healed, and the glandular tumours, as also the swelling of the surrounding cellular tissue, had disappeared.

Case 8. N. N., a young lad of Bonn, was affected by rickets, and has, in consequence, the peculiar deformity called pigeon-breasted. For nine years he had suffered under caries of the vertebral column, situated between the last cervical and the first dorsal vertebra. The tumour which was formed in that spot contained much purulent matter. Recovery, indeed, took place; but the vertebræ formed, at this part, a well-marked angular curvature. Some time back there appeared at the articulation of the right collar bone a scrofulous sore, two inches broad, and very painful, which furnished a considerable amount of whitish clear purulent fluid. The adjoining parts were swelled, and the margins of the sore were sharply cut. In several other parts suppurating sores were formed. The patient was distressed by hectic fever, which was attended with shiverings and nocturnal perspirations. Cough was frequent, and respiration was painful.

The remedies accounted antiscrofulous were employed for the space of ten months. The patient took internally the cod liver oil; externally, he employed the fomentations of Rust, and mercury, especially in the form of red precipitate, as well as several other remedies,—all without beneficial effect.

In this miserable condition, at the end of October 1841, the patient had recourse to Dr Ungar, who, finding that almost all the usual antiscrofulous remedies had been employed in vain, despairing of re-establishing the patient's health, considering his unfavourable condition, thought, nevertheless, that it was his duty to try the remedy so much recommended by M. Negrier. At the end of one week of the use of the walnut-tree leaves, the sores began to become clean, and to assume a different and more favourable aspect; small healthy granulations began to appear; and at the end of six weeks the ulcer was entirely healed. The boy, who would have been considered as a certain victim to death, enjoys at present the most perfect health.

Case 9. Peter Meyer, aged seven, was affected with swelling of the glands of the neck, and with hard glandular tumours of different sizes. To this time the patient had been taking cod liver oil without benefit. He then took, during the space of six weeks, the preparations of the walnut-tree leaves; and from that time the glandular swellings subsided, and the small number of those which remained were greatly diminished in size. In consequence of the walnut-tree leaves being awanting, the treatment was given up.

M. Nasse gives the following statement, on the results which he has obtained from the preparations of walnut-tree leaves in the clinical establishment at the University of Bonn.*

" Since the time when we mentioned in the Journal of the Correspondence of the Physicians of the Rhine and Westphalia, No 20, 1842, the employment of the leaves of walnut-tree as a remedy against scrofulous disorders, we have, in our course of clinical medicine, treated one hundred and seventeen children labouring under different forms of this malady, with the extract or the infusion of the leaves, or with both at once. In all these cases this remedy has been employed alone for a certain time; it was only subsequently, and only under certain circumstances, that we have had recourse to cod liver oil.

" The patients were for the most part between three and six years of age. They were boys and girls. Their parents were, with few exceptions, indigent.

" Among the hundred and seventeen cases, ninty-nine belonged to the wards of the City Asylum. There the children spent, excepting on Sundays, the greater part of the day. Eighty-four remaining there to dinner, were protected from the cold during winter, being exposed only in the morning and evening, in going to and returning from school."

The food which they receive consists of soup of the flour of

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* Journal of the Correspondence of the Physicians of the Rhine and Westphalia. 3ieme Annee. No. 2, p. 17.

meal, of rice and milk; to this potatoes are added. Few of these children eat meat-soup; and when they get this, it is only twice a week.

Among sixty-seven children treated by means of walnut-tree leaves, the scrofulous disorder had an acute character with inflammation, or the character of excessive irritability. Among fifty of them, the scrofulous disorders were accompanied with natural torpor, or they were in the chronic form and that of cold tumours.

Besides swellings of the glands of the neck and of the mesentery, some peculiar diseases accompanied the scrofulous distempers; for instance, inflammations at the anterior part of the eyes, at the ears; eruptions on the head (*eczema chronicum; impetigo capitis; favus*). Some had at the same time two or three of these disorders.

In the case of all those children, in whom their parents had not given up the treatment, the remedy was employed for several weeks, and even months. If the infusion did not appear sufficiently strong, recourse was had to the extract.

Of the hundred and seventeen children subjected to treatment, forty were rapidly cured of scrofulous symptoms. Fifteen among them had never been at school.

In twenty-seven of the forty cured, the scrofulous distempers had an acute character; in thirteen a chronic character.

Nineteen of those cured (thirteen cases of acute scrofula, and six of chronic distemper) had also other peculiar diseases. Eruptions on the head affected eleven of them; inflammation of the eyes, four; inflammation of the ears, two; bronchitis, one; and intestinal worms, another.

The cure was in all cases slow. No abscess was observed.

Sixty-two of the children who had persevered in the treatment were much better. Among these, thirty-six had acute scrofulous disorders, and twenty-six had chronic scrofulous disorders. Thirty-two of the convalescents had other peculiar distempers, as eruptions on the skin, disease of the eye, &c.

Among fifteen of the hundred and seventeen children subjected to treatment (some of these spent the whole day in the schools and there took their mid-day meal), the preparations of walnut-tree leaves produced no effect, whether they were employed in the form of infusion or in extract. Four only among the fifteen were labouring under acute scrofula; the other eleven were instances of the chronic form of the distemper. In two instances the presence of another disease caused the treatment to be suspended. Two among the fifteen children were of very feeble constitution; the others had begun the treatment only for a very short time.

Ten among the children who had not been cured were further affected by distempers proceeding from scrofula. One with acute scrofula was labouring under rickets and inflammation of the external part of the *meatus auditorius;* another had *favus.* Of the eight who had chronic scrofulous ailments, one had been long suffering under *impetigo capitis;* another had inflammation of the eyes; a third rickets and an eruption on the head; a fourth inflammation of the eyelids and *favus;* lastly, two others had inflammation of the eyelids and the auditory canal.

As the walnut-tree leaves exerted upon these fifteen children an influence only very feeble, or no appreciable effect, we employed for some time unpurified cod liver oil. Two patients underwent an amendment; but in none of them has the remedy as yet caused the disappearance of the symptoms. It is further necessary to mention in this place, that in two instances, instead of the extract of the walnut-tree leaves prescribed, a misunderstanding had caused for some time the administration of cod liver oil. In these patients, the scrofulous symptoms underwent sensible abatement. The children in whom the treatment has produced only a very trifling effect or none, are still in great part under this mode of treatment. Some only have been withdrawn by their parents. Of all this number, one only has died of water in the brain.

Dr Negrier next considers the memoir of Dr Borgiali. This memoir, entitled *Della Scrofula, e della sua cura col uso dei preparati di Noce* (*Juglans regia*), appears in the epistolary form. The author states that having read in the *Journal de la Société Medico-Chirurgicale de Turin* for February 1846, that, in consequence of a communication from Dr Frola to the society upon the use of hydrochlorate of baryta and of lime, and of hydriodate of potass in the treatment of scrofula, mention was made of the walnut-tree leaves, which, though regarded as without efficacy by certain members, were stated by others, to have been employed with success in the provinces of Ivrea and of Vercelli, he believed it to be his duty to publish his observations.

In the year 1830, when Dr Borgiali was substitute physician of the Beneficence of St Dalmas and of Carmen, he had convinced himself of the inefficacy of the muriate of baryta and of lime, and of the preparations of iodine, which were the first therapeutic means employed against scrofulous distempers. When he employed them, he was compelled to suspend their use, because it many times happened, that, though administered in minute doses, they gave rise to symptoms of gastro enteric irritation. Nevertheless, being aware of the inutility of all the usually commended specifics, and not knowing other means, he continued to prescribe them almost in spite of this conviction. Thus he continued to act until the treatise on scrofulous distempers by M. Le Pelletier came into his hands. Guided by the experience of this writer, and adopting his therapeutic principles, he confined his curative method to simple hygienic means, and he many times saw formidable disorders amended, while slight complaints yielded with greater difficulty. He did not, however, altogether adopt the opinion of M. Le Pelletier upon the primary cause of this distemper, which, according to him, is the result of bad feeding followed by bad digestion.

It appears that, in the Dissertation or Monography, by M. A. C. Baudelocque, already mentioned, is given a letter from M. Borson of Chambery, in which M. Borson states that he had seen M. Jurine of Geneva prescribe the walnut-tree leaves against scrofulous distempers; and the same authority gives one case in favour of the method. This letter appears, however, to have been overlooked by several readers, as well as by M. Negrier, to whom it only became known more than two years after his first trials upon the children in the general hospital at Angers. At length, in the year 1841, M. Borgiali learned, by means of the French journals, that M. Negrier had employed, with advantage, the leaves of the walnut-tree; and, though a little diffident, from having almost always been disappointed in the accounts of the remedies sent from foreign countries, he did not hesitate, nevertheless, to employ this one on the first occasion that might be presented. In point of fact, when consulted on the 7th July 1841 for the patient designated in the first case, he, in agreement with Professor Beata, prescribed the decoction of the leaves of walnut with its husk in a cup of water, to be taken every morning.* The use of this remedy continued for six months, having perfectly cured the patient; he studied with new interest the effect of this drug in scrofulous disorders. During the ensuing year he ordered the decoction of the leaves of the walnut-tree in all scrofulous complaints. But a remedy, in some degree vulgar, without mystery, and destitute further of that speediness of action which is so much desired by patients, does not in all instances beget confidence. Several persons, from indifference and the trouble of preparing the decoction every morning, often suspended its use, or gave it up entirely. Many persons, nevertheless, followed the advice of Dr Borgiali, and obtained a degree of success proportioned to the time which they allotted to the treatment. In some persons they produced no effect; but of these some were advanced in age; others were suspected to be labouring under herpetic disorders; and others under organic changes in the viscera of the chest, or of the abdomen.

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* It may be here mentioned, that in the Pocket Formulary by M. Achille Richard, published at Paris in 1819, the husk of the Walnut (*Brou de Noix*) is mentioned among the Astringent Fruits. P. 123.—Ed.

Dr Borgiali adds that the cure of scrofulous disorders cannot be effected by means of the walnut-tree leaves, unless their use is continued for two, three, and even six months. In several slight cases of cutaneous crusts or trifling enlargement in the glands, he saw all traces of the distemper disappear after fifteen or twenty days of treatment. On discontinuing the use of the remedy for some days, the symptoms returned; but when the remedy was resumed, and continued for some time, they quickly entirely disappeared. He then inferred that it was necessary to employ this remedy for several months, even in recent and slight disorders, and that in severe and inveterate complaints long perseverance was necessary. In the cases of several persons who had made use of the drug for six or seven months, he thought it his duty to prescribe the subsequent year at the suitable season, the same treatment to be pursued for several months, in order to be assured of cure, and to prevent a relapse.

Dr Borgiali employed sometimes the decoction of the leaves, green, or dried in the shade, sometimes the fruit with the green shell, newly collected, or preserved in sand. Sometimes he used the extract as well of the leaves as the green shell. As to the decoction of the leaves, he caused from two to three leaves, infused in half a cup of water, to six, seven, eight, or even more, in one cup of water, to be taken according to age and disposition. As to the decoction of the fruit, he put one or two of them according to their size. The dose of the extract he varied from ten grains to sixty; but he adds that this has little action; he employed it, nevertheless, during the winter, and when the patient was averse to employ the remedy in any other form. He was in the habit of mingling the extract with two parts of lard, for preparing the ointment with which the sores was dressed.

At first Dr Borgiali administered this decoction only once daily and on an empty stomach. But he found great advantage in causing it to be taken several times, carrying the dose to one or two pounds of the infusion daily; nor did he witness any unpleasant symptom affect those persons who wished to take it in greater amount. He mentions, nevertheless, that two patients, one of twelve years, and the other aged thirty-four, both extremely feeble, to whom he had ordered the decoction of five leaves, were attacked by alvine evacuations so violent, that he was obliged, to prevent too great fatigue, to reduce the number of leaves to two.

The use of this treatment is ordinarily followed by profuse secretion of urine; and to this are often conjoined repeated alvine evacuations, especially during the first days of treatment. The digestive powers return; appetite is increased; and the patient, if peevish and dispirited, recovers his previous cheerfulness and vivacity.

Dr Borgiali gives thirteen illustrative histories.

Case 1. Giulio, aged fifteen years, of scrofulous temperament, and sprung of scrofulous parents, came to Turin in February 1841. He was labouring under severe catarrhal fever, with pains in the whole body and especially in the arms and legs. These symptoms were treated by antiphlogistic measures and by blood-lettings. Notwithstanding this treatment, the fever continued unabated, and new and violent pains were felt within the abdomen, accompanied with dysenteric symptoms, convulsive accessions, and contractions of the extremities. The patient having been conveyed to Yvrea, Professor Beata presented tamarind drinks, valerian, and several local bleedings from the abdomen by means of leeches. Under this treatment, the pains were assuaged, the convulsive attacks subsided, and the dysenteric symptoms abated; but swelling of the abdominal maxillary, submaxillary, and cervical glands ensued.

Dr Borgiali was consulted on the 7th July, when the patient presented the following symptoms. The lips and nose were swelled; emaciation was universal; all the members were shortened and contracted. The maxillary and submaxillary glands, as well as those of the neck, swelled; some as large as an egg, others like large pears, moveable and painful. The belly was swelled and painful, and fever, which was aggravated every evening, was intense. The decoction of one walnut with the green shell in a glass of water, was directed to be taken every morning, and nourishing regimen. The swelled glands were treated with emollient plasters; and traction was employed in order to remedy the contractions and shortening of the members.

On the 18th of the same month some abatement of all the symptoms had taken place, but the decoction produced diarrhœa. This treatment was continued for six months, and the patient was in the month of November following almost cured. There only remained some external glands, indurated and insensible, for which he was directed to continue the ordinary decoction, and to use the ointment of hydriodate of potass in unction over the hardened glands.

This young man has always, since the time specified, enjoyed perfect health, and presents no traces of his disease.

Case 3. Dominica, aged fifteen years, not menstruating, badly clothed, badly fed, dwelling in a house with bad exposure and in evil condition, of scrofulous temperament, the daughter of a mother who has the scars of scrofulous sores, of frail constitution, habitually has the lips and nose swelled, reddish, with pustules. After having small-pox she was in bad health for one year. At the age of nine, during a night of the month of May 1842, she was suddenly attacked with inflammation of the left eye, accompanied with fever. This was opposed by two blood-lettings, an emetic, and drinks cooling and slightly purgative. On the eighth day the disease had almost disappeared, redness of the eyelids and weakness of sight only being left. This state, which increased every month, persisted, notwithstanding the antiphlogistic treatment employed, to the end of November. It then ceased all at once entirely.

In May 1843, the same ophthalmia reappeared, and was treated in the same manner. In ten days all traces of inflammation disappeared. On the 5th of June, notwithstanding precautions to prevent relapse, this girl was suddenly attacked by the same disease in a form more violent. Observing the uselessness of the means ordinarily employed to subdue inflammatory disorders of this nature, and judging that this complaint depended on the scrofulous diathesis, Dr B. prescribed the decoction of from four to five leaves of walnut-tree to be taken daily. On the 22d of June there was still swelling and redness of the nose and lips, with pustules and grey crusts; the swelling of the eyelids was almost gone, though some redness remained. Five ulcers were observed, some on the sclerotic coat, others on the cornea. The decoction of walnut occasioned alvine discharges and a copious secretion of urine. The patient was ordered to continue the use of the remedy every morning, and to increase the number of leaves.

On the 17th of August, though the patient had used the medicine only at intervals, and had only indifferent food, the ophthalmia was quite gone, as well as the swelling of the nose and lips. The appearance indicated the presence of excellent health.

The patient desiring no longer to continue the use of the remedy either at that time or the subsequent year, was attacked in the end of 1844 with a glandular swelling at the angle of the lower jaw on the right side, which, treated by emollient plasters, degenerated in August 1845 into a suppurating sore; and the bone of the lower jaw being attacked, Dr Chiaves extracted a fragment in December following. The sore, meanwhile, was healed; but the scrofulous temperament continues, indicating its presence by the swelling and paleness of the face, and the size and redness of the lips and nose.

Case 4. Lucia Ravera, aged seven years, in a state of great wretchedness, the daughter of scrofulous parents; had never suffered any marked disease. About the end of March 1842 swelling attacked the first phalanx of the large toe of the right foot. This swelling suppurated, and several fragments of bone were discharged. Treated during October by a woman with the oil of St John's Wort (*Hypericum*), the sore healed up. Some days after, this child was attacked with a painful pustular eruption round the eyes; the left was surrounded with crusts; vision was extremely painful; the symptoms became more severe every day. On the 19th of June the face was pale and swelled; the maxillary and axillary glands swelled; an eruption of small pustules extended round the left eye, from the eyebrow to the cheek; the eyelids and the sclerotic of the right eye were injected; appetite was bad, digestion difficult, and the patient was spiritless. The decoction of two, then of three walnut-leaves, was ordered to be taken once or twice daily. After using this decoction, appetite was felt, digestion was more easily performed, the patient became more cheerful, two or three alvine discharges took place daily. On the 15th of July the patient was much better, and treatment was continued to the end of October. The eruption had then quite disappeared; vision was good; the functions were in general natural; and the patient's spirits were good. A small tumour had appeared, however, a few days previously, on the left shoulder. Treatment was continued; and in January 1844 the patient was completely cured, though she was always very badly fed. Since that time she has suffered neither from scrofula nor from any other disease.

Case 5. Carlo de Lorento, born at Parma, scrofulous, suffered constantly between the age of six and twelve years, either from ophthalmy in both eyes, or abdominal pains. In June 1843, at the age of twelve, the eyelids were greatly swelled, the eye-ball was covered with white streaks and thick spots, which almost concealed the pupil and iris of each eye, and almost destroyed vision. Under the use of the decoction of four walnut-tree leaves, then five, six, and eight, continued for eight months, he was entirely cured. Only some white specks remained on the cornea, but they caused little impediment to vision.

Case 6. Jacinto, of middle rank, aged twelve years, sprung from scrofulous parents, brother of seven children dead of this distemper, was at all times unwell, tormented by pains in the abdomen, affected occasionally with vomitings. On the 19th of June 1843, the countenance was pale, bloated; the expression sad; the glands of the right arm-pit suppurating; and the belly swelled and painful. The child had aversion to all moist food; he had no appetite; the digestion was slow; and slight fever was observed in the latter part of the day. He was ordered to take the decoction of four walnut-leaves for fifteen days, afterwards that of five leaves with nutritious diet.

On the 22d of July the complexion was improved; the countenace, no longer bloated, had a cheerful expression; the belly was less swelled and less painful; appetite and digestion were good; the urinary secretion considerable; and the sores had a better appearance. As he refused to continue the use of the decoction, pills of the extract, each containing two grains, were ordered, and of these he was to take ten daily.* The sores were dressed with an ointment consisting of two parts of lard and one of extract.

On the 19th of August pains of the abdomen were slight only and unfrequent; the appetite was good; and only two sores, not very deep, were left. The treatment was continued to the end of December, when he was quite cured. His health was good on the 16th March 1846.

Case 7. Giuseppa, ten years of age, the child of a scrofulous mother, had on the sternum, at the insertion of the third ribs, a tumour as large as the egg of a turkey, and which presented the usual characters of the scrofulous tumour. An ointment, formed of two parts of lard and one of extract, was ordered to be rubbed on the tumour two or three times daily.

This treatment was continued for several months, but without manifest good effect. The tumour proceeded to suppuration, and a sore was formed, having all the characters of scrofulous disease. The following year, at the beginning of May, the patient came with a sore which was enlarging, and which, as she stated, caused much pain, and assumed a bad aspect at certain determinate lunar periods. She was directed to take the decoction of four walnut-leaves, or of two or three fruits. In the month of June following, her father, in order to be spared the labour of daily preparation, provided a certain quantity of leaves with small fruits, and of these made several bottles of decoction, of which he gave daily one large cupful. When this first quantity was exhausted, he prepared successively others, always with the leaves and the fruits. In the month of December the same year, he had the happiness to see his daughter quite cured. The ulcer had been dressed only with an emollient ointment.

This case shows that it is the internal use of the remedy for some time that is most efficacious in curing scrofulous disorders.

Cases 9, 10, 11, 12. Clara, Eugenia, Maria, and Giacomo Fonino, whose brother and sisters had all died of scrofulous distempers, were in June 1843 the subjects of the following symptoms.

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* This seems to mean ten pills daily. But the expression is not very clear.

Clara, aged eleven years, had a pale bloated appearance, and was emaciated. The belly was swelled and painful, very sensible to the slightest pressure. She had no appetite, and had slight fever, which showed itself from time to time in the middle of the day.

Eugenia, aged seven, had also the face pale and swelled; the eyelids red and swelled; the belly large, and painful on pressure; no appetite.

Maria, aged five years, rickety, presented symptoms indicating the commencement of tuberçular phthisis.

Giacomo, aged four, had the belly swelled, the lips red and unhealthy; light was painful to the eyes; he had no appetite, and was subject to gastric catarrhal feverish attacks.

All four were subjected to the use of walnut-tree leaves, and all were cured of the scrofulous distemper. Eugenia died the following year, of small-pox. Maria continued in good health, though she continued rickety, with a twist in the spine. The boy, though pale, enjoyed good health, and is free from gastro-catarrhal symptoms. The following year, they all employed the decoction during the month of July.

Case 13. By Professor Beata. Giovanni Avignone, born at Yvrea, about seventeen years of age, with parents believed to be scrofulous, was brought to the Civil Hospital of Yvrea, in 1844, in the following state. He had scrofulous swellings of the maxillary and cervical glands, two of which had already formed sores of disagreeable appearance. Abdominal pains indicated the affection of the mesenteric glands, and slight but constant fever with emaciation showed the onward progress of the disorder. Suitable regimen, and the use of hydrochlorate of lime morning and evening, were continued for one month without producing any good effect. Baryta was then taken in the same manner, and at the same time, ointment of hydriodate of potass was applied over the indurated glands. Emollient poultices were also employed, and the sores were dressed with digestive ointment, strengthened by some grains of the red oxyde of mercury. This treatment, though pursued for more than one month, was followed by no amelioration. After all these unavailing attempts, towards the month of July, the decoction of the leaves and fruits of the walnut-tree were employed. At first, the decoction with the leaves and the fruits of the walnut-tree was given in the dose of four ounces every morning. The use of this drug was followed by several alvine evacuations, and, above all, by a sensible increase in the digestive powers. In short, under the influence of this treatment, aided by nutritious diet and corporeal exercise, the swelling of the glands disappeared in the course of fifty days. The sores were healed, and the patient left the hospital completely cured.

Dr Negrier considers that these testimonies by the four foreign physicians constitute a complete eulogium on the remedy. These physicians prefer the walnut-tree leaves above all the remedies hitherto employed. They all agree that it is quite free from offensive and hurtful properties; and they allow that its action has been steady and constant, and less slow than he had represented it to be.

To a few specific facts Dr Negrier directs particular attention.

1. The Italian physicians use nearly indiscriminately the leaves and the fruits of the walnut-tree. Dr Borgiali ascribes inferior effects to the extract of the leaves, and this he uses only in winter, when recent leaves are not to be obtained.

2. The Italian physicians observed an increase in the frequency of the alvine dejections at the beginning of the treatment. This Dr Negrier did not remark at Angers,—a circumstance which he confidently traces to this fact, that the Italian physicians prescribed to their patients a large quantity of the recent decoction, namely, several pounds in the day. In other respects the facts communicated by Dr Borgiali are similar to those given by Dr Kreutzwald. They are not new; but they demonstrate the efficacy o the treatment in curing various forms of scrofulous distemper.

3. The memoir and facts given by Dr Nasse are much mor valuable, in so far as they are the result of clinical observations made in an hospital containing many scrofulous patients. At Angers, i appears, as in some other places, the medical staff undergoes a change at the end of each three months, and as it seldom happens, it seems, that the new physician is disposed to follow out the course of practice and clinical observation traced by his predecessor, it is not easy to obtain consecutive series of observations on any given piece of practice. As M. Nasse makes the examination of the treatment of scrofula by means of preparations of walnut-tree leaves the subject of Lectures in the Clinical Department of a University School, M. Negrier thinks it may be inferred, that neither length of time, nor the exigencies of regular treatment, nor even the vulgar character of the remedy, will be reasons capable of making him neglect or reject the treatment.

Combining the cases reported by Dr Kreutzwald, with the facts which form the basis of the essay by Professor Nasse, the number of children treated by the walnut-tree leaves amounts to 127. In this number are 47 cures, prompt, permanent, and without relapse. This is more than one-third of the patients treated.

The number of scrofulous patients whose history M. Negrier has given in his two memoirs is only 70. The number of persons whom he has reported as cured is greater in comparison than that of the Professor of Bonn. It exceeds the half of the entire number. He does not regard this as a proof either of greater skill or greater good fortune. The difference proceeds from this, that he observed his patients several years in succession, and that on the banks of the Rhine the treatment has most commonly been given up on the disappearance of the fresh leaves of the walnut-tree.

4. At Angers, Dr Negrier observes, that the amendment in the symptoms requires a much longer time than at Bonn, and still longer in comparing them with the facts given by Dr Borgiali. The reason of this difference he explains in the following manner. The patients, whose history Dr Negrier has given, were for the most part afflicted with severe forms of scrofula. One-third, at least, were affected with carious bones, with swellings of the large joints, with fistulous ulcers penetrating into the synovial capsules. The patients of Professor Nasse, on the other hand, presented for the most part, like those of the Italian physician, with one or two exceptions, only general symptoms of the distemper, or merely some slight affections, and not serious local maladies, which could be modified and cured only after a slow and complete regeneration of the health of the patient.

5. M. Negrier mentioned several scrofulous persons whose disorders completely resisted the action of the remedy. Similar facts were observed at Bonn. At Angers these facts are comparatively something less numerous.

6. In the clinical establishment under Professor Nasse, the number of patients whose conditions have been greatly amended is greater than that which M. Negrier remarked as to the cases belonging to himself. It is, in like manner, in the severity of the disorders, he says, that the explanation of this difference must be sought, as also of the greater proportion of deaths which is observed in the two memoirs of M. Negrier.

7. One fact of great importance resulting particularly from the observations of M. Nasse and M. Kreutzwald is, that almost all the patients whom they had treated and cured by means of the leaves of walnut-tree, had previously been treated with no benefit whatever by means of cod liver oil.

At Angers, M. Negrier states it was impossible for him to make this comparative experiment, for two reasons. The first was, that the treatment by means of cod liver oil, which is attended with difficulties in administration, was little known and little trusted in 1837; and the second reason is, that having found a satisfactory means of cure, it was then useless for him to seek for another which was greatly more expensive,—an important consideration in hospitals.

M. Negrier, nevertheless, had recourse, in several instances, to the use of the Fish Liver Oil. This medicine appeared to him to be particularly efficacious in cases of caries in patients wasted by long suffering. In these instances, almost always he combined the two means; decoctions of recent leaves of the walnut-tree, and cod liver oil given in spoonfuls morning and evening.

8. Another remark he offers on the facts given by the German practitioners. They have employed successfully the walnut-tree leaves for the removal of symptoms which he had met with too seldom to keep any account of it in his inferences. He refers to the leucorrhœal discharges from the sexual organs of young girls, and the eruptions on the scalp and face. Since the time when Dr Negrier became acquainted with the facts collected by Dr Nasse and Dr Kreutzwald, he has not had occasion to treat the discharges in young girls by the general treatment now recommended, but he has often prescribed, with marked advantages, injections within the vagina and to the uterus with the decoction of leaves of walnut-tree in adult females affected with leucorrhœa, and also in cases of relaxation of the vagina, *procidentia* of the uterus, and even in instances of erosions and granulations on the lips of the uterine neck.

One new fact which he gives is the case of a complete cure of *Tinea Favosa* by the use of the leaves of walnut-tree.

A young girl of St Laud, aged ten years, was brought about two years back, 1848, with *favus* covering the whole skull. Justly terrified at the pains of treatment, by tearing out the hairs by the pitch plaster, she promised to be patient, and perform faithfully what was ordered. The treatment consisted in three glasses of the infusion of fresh walnut-tree leaves in the course of twenty-four hours. The scalp was carefully shaved twice in the week. When the hairs were removed, the scalp was washed twice each day with a strong decoction of the leaves, and it was covered with a poultice of linseed meal diluted with the same decoction of walnut-tree leaves. Often after the use of the razor, the head was covered with oil of sweet almonds. The poultices were usually applied only during the night. For one week, also, a lotion with water of soot was applied daily, and this was the only agent foreign to the treatment by means of walnut-tree leaves, which was employed. The regimen consisted of one meal of animal food daily; water and wine, or beer for drink. The treatment was continued about eighteen months.

This fact possesses a certain degree of value; and if similar facts with the same results were multiplied, this new application, borrowed from the German physicians, would prove an important therapeutic acquisition.

Although it was the intention of Dr Negrier to report in the present (third) memoir only facts derived from other authorities, that he might avoid being at once party and judge, he gives, nevertheless, two facts among the observations which he has collected since the publication of his second memoir. The first he regards as too remarkable to be lost in the heap with others. It completely confirms his assertions upon the importance of the use of walnut-tree leaves in those scrofulous disorders of the eyes which are still sources of discredit to the surgeon oculist.

Case 1. Emily B., aged ten years and a half, resident in the suburb Bressiques, was the child of healthy parents. One of her sisters had suffered as well as herself, for several years, under a scrofulous disorder in the eyes, which ceased only at the nubile period, leaving, however, white specks on the cornea. E. was thin, emaciated, though her infancy was exempt from serious diseases. Previous to 1848, she was attacked with enlargement of the cervical and submaxillary glands. Some proceeded spontaneously to suppuration; others were opened by the bistoury.

In the month of February 1848, the child was attacked with severe ophthalmia affecting both eyes. This attack consisted in inflammation of the conjunctiva, palpebral and ocular, with considerable swelling of the eyelids. There was painful intolerance of light, acrimonious lacrymation, and on separating with acute pain the eyelids, the cornea was seen to be of a general milky colour, and vision was gone.

In this state the patient remained six months without ever being able to open the eyes even in the dark. The first treatment was almost nothing, more from the carelessness of the patients than from want of rational advice. The child was subjected to treatment by means of the walnut-tree leaves in the first days of November 1848. This consisted in infusion of dry leaves, three glasses, with syrup. To the eyes were applied lotions and injections of a collyrium consisting of decoction of walnut-leaves and of belladonna. To this was sometimes added one-third of ox-gall. This treatment was strictly pursued for thirty days.

Improvement soon took place. On the twelfth day, the girl opened her eyes and bore moderate light. The corneæ were greyish. The patient could not distinguish a piece of money.

Towards the thirtieth day, the state of vision was so much improved, that the patient was able to direct her own motions. In the month of February 1849, she read without fatigue. At present she works as a laundress. Of the whole leucomatous deposit in the cornea, there remains on each eye only one very small albugineous spot, situate below and on the outside of the axis of vision as to one eye, and below and on the inside of that axis for the other.

The general treatment was continued two or three months. It is to be resumed in 1849 during the season of the walnut-tree leaves.

The second fact is recorded chiefly because it forms a new and rare example of the inefficiency of the treatment, at least form one local symptom of scrofulous disease.

Case 2. James G., aged three years and a half, a child of delicate but good proportions, lymphatico-sanguine in temperament, whose mother had died at thirty, and grandmother at sixty, both of phthisis; was attacked at the age of fourteen months with swelling in the thumb of the right hand, and the index finger of the left hand. The soft parts covering the diseased and swelled bones were quickly affected with inflammation and ulceration, and fistulous sores were formed, which allowed particles of carious bone to escape from time to time.

After matters had proceeded in this way for six months, the child, when seen by M. Negrier, was small, emaciated, suffering, with bad digestion, disturbed sleep, and cough.

The child was subjected to the use of walnut-tree leaves in infusion, edulcorated with syrup at the rate of from three to six teacupfuls daily. He liked this drink, and took it with food.

The effects of the medicine upon the system at large were very obvious. The boy became cheerful; the appetite was good; he became strong and plump; he walked alone with firmness, which he had not hitherto done. Upon the caries and the sores the preparations of walnut had no effect for one whole year, during which the treatment was continued almost without interruption; and meanwhile lotions, local baths, without decoction, were punctually repeated daily.

The child was now three years old, vigorous, intelligent, in perfect health, excepting the caries in the fingers, when M. Negrier put in use the cod liver oil. Of this he took the amount of three teaspoonfuls daily. At first he took it without great repugnance; but after using it for one month it became insupportable. The oil was continued, nevertheless, about four months. The quantity taken may be estimated at between six and seven hundred grains.

At present, 1st July 1849, the child has been cured for a month. The thumb of the right hand is not very much deformed; it is a little shortened, and thicker at the base than it ought to be; it is moveable in all the articulations. This is not the case with the index finger of the other hand, which has two sores. This finger can be neither bent nor extended; it is strongly inclined towards the thumb; contracted in the middle, it is thick, below and above scars deeply adherent. This member, useless and deformed, easily thrown to the right and to the left, should be removed by amputation. The father of the child wishes to wait till he is older.

The patient is to continue the use of the infusions of walnut-tree leaves annually during the summer season.

The successful effect of the cod liver oil noticed in this case recals to M. Negrier the remembrance of the German physicians, who appear to have employed that agent without advantage in almost all the cases which they have reported. He proposes as a question, whether the cause of this want of success may not proceed from this circumstance, that they have employed the medicine only to oppose affections of the lymphatic system or of the skin. According to his observations, not very numerous, he allows (four cases), cod liver oil produces good and speedy effects only in cases of diseases of the bones, of their cartilages and ligaments; while then the preparations of the walnut-tree leaves have acted only very slowly, and in some circumstances they have produced no perceptible local effects. In the ten cases, indeed, reported by Dr Kreutzwald, there is only one indicating caries of the collar bone. Professor Nasse mentions only one instance of disease of the bones, rickets, as complicating the other scrofulous symptoms. He adduces no case of caries of the articulations similar to those which M. Negrier has produced to same amount,

The same is true of the cases given by Dr Borgiali. This physician reports not more than one single instance of swelling with suppuration of the articular heads of the great toe (Case 4 of his memoir).

Conversely, the three foreign physicians have unanimously proclaimed the excellent effects of the treatment by walnut-tree leaves, in instances of scrofulous disorder of the skin, and of the scalp, in *favus, impetigo capitis*, mucous and crustaceous eruptions of the face and of the auditory meatus with otorrhœa, inflammatory states of the eyelids, inflammatory states of the conjunctiva, palpebral and ocular, leucorrhœa, and swellings of the lymphatic glands, the submaxillary, those of the neck, armpits, groins, and the mesentery.

From the examination of the facts communicated by the three physicians already mentioned, from the examination of detailed histories, both those published in his two memoirs of 1841 and 1844, of which most of the subjects have been observed till the present time, and facts observed since that period and not published, the number of which M. Negrier can carry to thirty, he considers himself authorised in establishing the following corollaries. These are borrowed almost entirely from the second memoir; but a few of the conclusions given in 1844 are slightly modified; others are added. For these modifications the author allows that he is indebted to the facts collected by those physicians whose memoirs he has cited; and he allows that the modifications thus formed may constitute the principal merit of this memoir.

Corollaries.—1. Scrofulous distempers are in general radically cured by means of the preparations of the leaves of the walnut-tree.

2. The action of this mode of treatment upon the system is sufficiently steady to enable the practitioner to depend upon the cure of the greater number of the persons treated by this therapeutic agent.

3. The influence of the preparations of walnut-tree is slow, free from hurtful effects, and durable.

4. The first effects of the treatment upon the economy are general. The local action takes place subsequently.

5. Scrofulous disorders of the skin, of the mucous surfaces, of the system of lymphatic vessels and glands, are cured as easily, as speedily, and more certainly, by the preparations of walnut-tree leaves, than by any other method at present known.

6. Disorders of the osseous, the cartilaginous, and the ligamentous system, depending upon the scrofulous taint as their principle, are sometimes radically cured by the use of preparations of leaves of walnut-tree alone. Lymphatic subjects experience always good effects from their use. The thorough modification which they derive from the use of this drug, produces often the cure of caries of the bones and their appendages. These same disorders of the bones, in the case of dry nervous subjects, are not perceptibly modified by treatment. Cod liver oil is, in these circumstances, to be preferred, combined with infusions of the leaves or the fruit of walnut-tree,—that is, the husk or shell of the nut.

7. Scrofulous ophthalmies are certainly and speedily cured by treatment, the basis of which consists of the preparations of the leaves of the walnut-tree.

To the preparations already mentioned, M. Negrier has added a wine of walnut-tree leaves. This is prepared by macerating from fifty to sixty grammes of the recent leaves, or ten or twelve nuts covered with the drupe, cut into fragments, in one litre or two pounds of Malaga or Lunel Wine. In winter this wine is prepared with from fifteen to twenty grammes of the extract to the litre of wine. This wine is given in spoonfuls morning and evening, after meals.

The eye-waters have been modified. For the opium, extracts of Thridace and belladonna have been substituted. From ten to twenty centigrammes of extract are dissolved in thirty grammes of decoction of leaves of walnut-tree.

[The foregoing account will enable readers to form some estimate of the probable therapeutic effects of walnut-tree leaves as a remedy against scrofulous disorders. In making known these observations, it is not understood that we express any opinion either for or against the remedy. It has been subjected to trial by physicians who are entitled at least to be heard, and in circumstances which constitute a certain amount of claim upon professional attention. If these circumstances induce others to give the remedy further trial, this is all that can be expected; and if it be proved upon trial, that the remedy realises in this country the expectations which the accounts given are calculated to awaken, a useful agent may be added to the catalogue of anti-strumous agents.

The most important lesson that results from the facts contained in the previous memoir, is the advantage, if not the positive necessity, of acting upon the system at large in attempting the cure of scrofulous local disorders. It cannot be denied, that in treating these disorders, greatly too much attention is given to the local complaint, while general means are either very much or totally neglected. Both in affections of the glands and in instances of diseased bones, it is too frequently the practice to trust very much to local treatment and to mere surgical measures. In the case of diseased bones especially, it is quite common to see the surgeon cutting, sawing, and using caustics of various kinds, and not unusually removing entirely the diseased bone or bones, or the part in which the bone is situate, under the idea either that they do not admit of being restored, or that before their restoration the health of the patient must be irreparably injured. He appears not to think that if he improved and strengthened the general health, the local disease would subside and disappear. This is a very great delusion. If the present paper is good for anything, it ought to show clearly and without any doubt, the great importance of the use of remedies which act on the system at large. It is probable that walnut-tree leaves possess no specific power against scrofula. But it is clear that under their use the digestion is improved and strengthened; the alvine excretions and urinary secretions are increased and rendered more regular; the circulation is rendered healthy and energetic; and while these changes are proceeding in the system, the local disease or diseases subside. It is probable that, under the use of many other agents, similar changes may be effected. At least it is certain that, under favourable circumstances and due attention to other means, scrofulous diseases have been cured. It is unnecessary here to refer to all the means by which these and similar changes have appeared to have been effected.

Meanwhile it is important and serviceable to know that there is a remedy, and that one of great simplicity and free from harm, by which favourable changes in the functions may be effected.

Perhaps it may be proper to advert to another circumstance in estimating the comparative effect of this drug in continental countries and in this island. The summer weather in the countries in which it has been hitherto tried is much more steady than in our insular climate; the air is more dry; and altogether the physical circumstances are more favourable for the alleviation and removal of scrofulous disorders than in this island. It is, in short, possible that slighter and more gentle medical measures may produce palpable therapeutic effects in France, the Rhine Provinces, and Italy, than in Great Britain, in which summer weather is late in appearance, unsteady during its abode, and not long in duration.]

ART. IV.—*On Catalepsy or Trance.* By EBENEZER MILNER, M.D., Edinburgh, L.R.C.S.E.

CATALEPSY being a disease of extremely unfrequent occurrence, has always received marked attention, from those who have witnessed the remarkable and striking phenomena by which it is characterised.

The disease is known to nosologists as CATALEPSIS, and may be briefly defined as a morbid affection of the human system, characterised by more or less sudden loss of consciousness, of volition, and of muscular motion, at least that known as voluntary, with persistence of the attitude in which the patient was observed to be, at the period of the invasion of the disease, or in which he had been purposely placed.

The early history of this disease is involved in much obscurity, more especially as different names have been employed to designate it, by various authors.

Hippocrates has been supposed to have described the disease under the term *catochus.* Other authors have noticed it under the names, *aphonia comatodes*, *apprehensio*, &c. But Asclepiades is understood to have first given it the name by which it is now known.

It is impossible to define the meaning of the descriptions given by the oldest authors of any of the so-called disorders of the nervous system, because they were unable to distinguish one disorder from another, and consequently described *syncope*, *coma*, *apoplexy*, *phrenitis*, *tetanus*, and other diseases in conjunction with that of catalepsy, as one and the same morbid affection.

Cœlius Aurelianus has the credit of being the first physician to separate catalepsy from other nervous diseases, and to describe faithfully the signs and symptoms by which it is known. If, however, it be true, that he supposed cataleptic patients "to fall like an ox under the murderous stroke of the butcher; tears to flow plentifully from their eyes; the muscles of their lower jaws, their lips, and eyelids, to be subject to frequent involuntary contractions or twitchings; and their hands and fingers to be firmly clenched;"—it is evident that he was not aware of the characteristic symptoms of catalepsy, and that he was unacquainted with the disease which has, in later years, been admirably described by Boerhaave and other physicians following him.

Many of the older authors on medicine have discussed the question, whether catalepsy and epilepsy were not one and the same disease. Galen appears to have recognised catalepsy as a distinct disease; but by far the greater number of authors regarded the two as identical, and employed either name indifferently to designate either disease. Notwithstanding all that had been written concerning its nature and its causes, the symptoms were always described with a degree of vagueness, and with so great an admixture of hypothesis, as to render the whole totally unintelligible.

The same may be said of their notices of the causes of the disease, which are generally nothing more than the most untenable hypotheses. Thus, a very favourite explanation of the nature of catalepsy was, that the nervous matter or fluids had been frozen by cold, the extreme effects of the one being considered identical with the prominent symptoms of the other. They were confounded together, because insensibility and rigidity of the limbs are observed in both cases.

The history of catalepsy, in more modern times, may be said to be the history of disease itself. As physicians began to observe diseases with more care and attention than had been usually bestowed on them, the symptoms by which they were known were described with a greater degree of truth, and the diagnostic marks, by which they were distinguished from each other, were noted with considerable precision; catalepsy had its share of attention, and was at length clearly distinguished from epilepsy, hysteria, and other diseases of a somewhat similar character.

But the position which catalepsy should hold in the catalogue of diseases has never been satisfactorily determined by nosologists, nor will it be determined until our knowledge of the exact nature of the morbid changes causing or following it has been greatly increased. It was supposed by some to belong to the class of comatose diseases. Cullen considered it to be a species of apoplexy, and called it cataleptic apoplexy. It has also been regarded as a convulsion; and it is now classed among the NEUROSES, or diseases of the nervous system. Whether the disease is placed in its proper nosological position or not, is a question which it is unnecessary to discuss. Indeed, the very evident lesion of the functions of the organs of sense, the total loss of sensibility, and the abrogation of the power of performing voluntary motion, indicate that the nervous system is the chief seat of the disease.

The cataleptic patient may be pinched, cut, seared with a red hot iron, or submitted to other strong stimulants to sensation and motion, yet he exhibits no signs of perception, and is incapable of removing his person from the object that is injuring him.

Before entering on the consideration of the causes, symptoms, and the whole pathological history of the disease, it is necessary for me to premise, that, having seen but one case where all the phenomena were well marked, and fully comprehending the difficult task to give a comprehensive and correct view of all that is stated concerning it in the writings of others, I shall endeavour to state cautiously those facts only which seem least exposed to be called in question. It is now well understood that the phenomena of catalepsy oftentimes precede or follow an attack of hysteria, of monomania, and of somnambulism, complicating, and being complicated by, these affections to a certain degree, so that it is almost impossible to distinguish, in some cases, the primary disease from the secondary phenomena. In consequence of this, there is still great confusion in the various descriptions of catalepsy which are on record, and, therefore, in attempting to describe the disease in all its bearings, I may have been misled, and have stated what, on further investigation, may not be found to be strictly correct. If such should be the case, the necessity of placing reliance on the descriptions of the most credible authors, must be my apology.

Causes.—There is no disease whose development is not favoured by certain conditions, acting in various manners, and with different degrees of intensity; and, therefore, it is only necessary that I should mention, as briefly as possible, the various conditions which predispose to and excite Catalepsy or Trance.

The predisposing causes depend, for the most part, on the general constitution of the individual, as upon age, temperament, sex, and, probably, also on occupation. Individuals of a hypochondriacal, melancholic, or hysterical temperament are extremely liable, under certain circumstances, to fits of this disease; in fact, an attack seldom or never comes on except in those persons who have a strongly marked nervous temperament. Middle-aged or young people are most liable to it, the time varying from childhood to old age, although it is seldom observed before puberty or in the decline of life. Females are more subject to it than males, and this is readily accounted for by the greater nervous susceptibility of the sex. A sedentary life, intense study, and any occupation which depresses the general system or excites the nervous centres, may predispose an individual to an attack of the disease, especially where the sex and temperament are favourable.

Anything which diminishes vital power and augments the susceptibility of the nervous system, must rank as a predisposing

cause;—for example, exhaustion resulting from hœmorrhages, difficult labours, and frequent miscarriages, intense and long-sustained mental applications, great anxiety, violent and continued grief, religious contemplations, excessive venereal indulgences, and similar circumstances which act on the nervous system, and excite the emotions.

The exciting causes are identical with many of the predisposing, and differ from them more in degree than in kind. Amongst the many exciting causes which are usually mentioned, the following appear of most interest. Violent and sustained grief, a fit of intense passion, great terror or fright, unrequited affections, the sight of hideous objects, the immoderate use of spirituous or fermented liquors, worms in the intestinal canal, the sudden suppression of any discharge, natural or morbid, as the menstrual fluid, hœmorrhages from piles, the sudden extinction of an exanthematous eruption.

Catalepsy has also been known to ensue after disease of the ovary; and, as before stated, after other nervous affections, especially hysteria, which, in certain of its many forms, closely simulates it. The fumes of charcoal have also been conjectured to cause a fit of catalepsy, but it is most probable that the insensibility and loss of voluntary power over the muscles which follows on the inhalation of diluted carbonic acid was mistaken for trance.

It is to be remarked, that, of all the exciting causes mentioned above, those which act by an intense impression on the mind, and suppressed discharges, are the most powerful amongst adolescents and adults; but that when catalepsy or trance occurs in children, it is most probably owing to irritation from worms in the *primæ viæ.* It has been conjectured, however, that when catalepsy co-exists with worms in the intestines, the disease is independent of the irritation they produce. This may probably be the case in some instances, but it must always be remembered that worms are often the cause of convulsions; and consequently there is nothing to prevent them from producing any other affection of the nervous centres.

Catalepsy does not always manifest itself with any regular series of symptoms, and this probably arises from difference of cause and varieties in the constitutions of the individuals attacked by it. Perhaps this disease would be best understood by considering it, *first,* in its most simple and well marked form; *secondly,* in its various phases of complication arising from its co-existence with other morbid states of the functions of the brain; and, *lastly,* in the forms it assumes as a symptom of other diseases. Simple catalepsy is very easily recognised by certain symptoms of pretty regular occurrence in different cases.

Complicated catalepsy cannot be so easily recognised, nor studied with such ease, as the disease in its simple form, because its symptoms are more or less masked and modified by hysteria, mania, hypochondriasis, melancholia, and epilepsy, either of which may, and does not unfrequently co-exist with it, as already stated; and the two combined form a disease of a somewhat mixed character, and difficult of diagnosis. Symptomatic catalepsy usually ensues on an attack of remittent or intermittent fever, the presence of worms in the intestinal canal, suppressed discharges, and the like; and although it does not differ in any essential degree from the simple form of the disease, yet it is well to consider it as constituting a distinct form, inasmuch as while therapeutic remedies are being used against the more formidable symptom, the disease of which it forms a symptom must be removed before any permanent relief can be given to the patient.

While I have thought it necessary to indicate the forms of the disease as best adapted to its practical consideration, I am compelled, by the limits of this paper, and by a want of knowledge of the disease as derived from personal observation, to consider them as one. With this premise, I shall at once proceed to describe the symptoms by which catalepsy is accompanied and known.

Premonitory Symptoms.—Fits of catalepsy, like those of hysteria, are ordinarily preceded by precursory phenomena, which announce their invasion. In some individuals, these phenomena present themselves in a regular manner, so as to enable the patient or the physician to predict the coming fit. They consist of cephalalgia, especially about the occipital region, general heaviness about the head, depression of spirits, and with it mutability of temper, pains and spasms of the muscles, more particularly those in the region of the neck, weakness of the intellect, vertigo, palpitation of the heart, ringing in the ears, together with a general feeling of lassitude. Sometimes the attack is preceded by a profound sleep. The countenance of the patient is either suffused with blood or preternaturally blanched, and he complains either of extreme heat or cold of the whole body; but these premonitory symptoms are not always observed. The individual is sometimes attacked suddenly, and retains the posture in which he was at the time of attack.

Symptoms.—Whether the attack be preceded by premonitory symptoms or come on suddenly, the individual presents a certain series of symptoms by which the disease may be known when not greatly complicated. The most prominent symptoms are total loss of sensibility, of intelligence, of sense, of voluntary and of reflex motion, the patient retaining the position in which he was attacked during the paroxysm, or in which he may be placed at the will of the bystanders. The eyes are wholly insensible to the action of light, the pupils being either contracted or dilated, and remaining so, however intense the stimulus. The greatest noises are disregarded by the individual, his organs of hearing being insensible to the impressions made on them. Smelling and tasting are alike impossible. He may be pinched; incandescent objects may be applied to the surface of his skin; wounds may be made in the most sensitive parts of the body; yet no impression is transmitted to the nervous centres, or if so, it is not perceived nor acted on; and the patient remains insensible and cannot execute the slightest movement.

The most prominent symptom, however, is the unvarying position of the body. All the others are seen in other diseases, but this is peculiar to trance. The limbs, which are found somewhat flexible in some cases, and more or less rigid in others, remain in any attitude in which the anatomical structure of the part permits them to be placed. If the arm, the hand, the thigh, the leg, and the foot, be flexed by the physician, they all remain so, until their position is altered. The countenance has not unfrequently the expression either of laughter or of grief, according to the ideas of the individual at the time of the attack.

When complicated with hysteria or epilepsy, this remarkable state of the muscular system is not so prominent. The rigidity of the limbs is greater, and, although by using considerable force they may be flexed or extended, yet, after the lapse of a greater or less period of time, according to circumstances, they return into their original position. This may also occur under other complications.

The most remarkable deviations in the temperature of the surface of the body are observed in different cases, occasionally, at various paroxysms in the same individual. The general surface may be hot or cold, the latter being the more frequent condition. But it is stated that one part of the surface may be hot, while another is cold. Whether this be true or not, cannot be satisfactorily determined. But we know that, in other affections of the nervous system, somewhat similar phenomena are by no means uncommon.

The eyelids may be open, as when the patient has been attacked during meditation; or may be closed, as occurs when the individual was seized during sleep. In some cases the eyelids have been found so firmly closed during the paroxysm that it was impossible to open them. Here, some complication most probably existed.

Sometimes the respiratory movements are executed with as much freedom as in health; at other times, the muscles of inspiration are involved in the same morbid change as the other muscles of the body, and respiration is then difficult.

Ordinarily, respiration is performed slowly, so as in some instances to be almost imperceptible, and, in rare cases, both inspiration and expiration are executed more strongly and more frequently than in health. It is impossible to account for these variations in different cases; the fact, however, that such variations are met with, is not without significance.

The action of the heart is affected in the same manner as the lungs in each individual; and this is to be expected from the intimate relation between the two. The pulsations of the heart may therefore be found more violent or less perceptible than in health, the latter being most frequently observed, and, in some cases, being carried to such an extent, as to render it difficult to detect the action of the heart either by the hand or by the ear. The pulse in the arteries will coincide with the diminished or augmented force of the heart; and here it is worthy of remark that, even in cases where the pulsations of the heart are scarcely perceptible, the carotid arteries often pulsate with considerable force, while the pulse at the wrist can be scarcely detected; showing, indeed, that there is a very considerable disturbance in the circulation, and more especially in the distribution of blood to different parts, and explaining why, in some cases, there should be such a marked difference in the temperature of the head, and the rest of the body.

Deglutition is in some instances performed with some degree of ease, but more frequently with extreme difficulty, and often not at all.

The alvine dejections are sometimes suspended during the paroxysm, and occasionally are passed involuntarily; but this rarely happens. The urine is either not secreted, or, if produced, is retained in the bladder, or passed involuntarily.

Digestion is in abeyance. In fact, all the functions of the body partake more or less of this very remarkable temporary state of physical and mental annihilation. I have already alluded to the expression of the countenance, and have now only to notice its state as connected with the circulation. In general, the face is but slightly altered; sometimes it is flushed, and even has the appearance of animation; and, at other times, it is pale and discoloured.

Such are the most ordinary symptoms of catalepsy. But if we consult the writings of different authors, and examine the descriptions of the various cases which have been placed on record, we observe at once that this disease presents itself with such different symptoms, as to render no two examples of the disease perfectly similar. This arises from the numerous complications to which the disease is liable, and therefore I shall now proceed to consider the various complications, and the modifications to which they give origin. Previously to doing this, however, I may remark, that the most prominent modification observed in the simple form of catalepsy, is the non-extinction of sensibility and voluntary motion; for it has been noticed that, in some rare cases, the patient is capable of making some very slight movements either voluntary or on the application of a stimulus,—this being due to reflex action,—and retains the power of perception in a slight degree, having apparently an imperfect consciousness of what is done at the time, but no recollection of it subsequently. Again, consciousness is sometimes perfect, or nearly so, while the power of speaking and of motion are in abeyance. There are numerous instances of this last form of imperfect catalepsy on record, and it has very generally received the appellation of Catochus from nosologists, Galen being understood to have first distinguished it.

Symptoms in Complicated Catalepsy.—The above exceptions to the general form of symptoms of catalepsy are for the most part due to hysteria; mania also complicates and modifies the symptoms of catalepsy, but both it and hysteria generally take on a different character to that which has been described above. The modifications produced in the ordinary symptoms of catalepsy by mania, and more especially by hysteria, are usually of such a marked kind as to have led physicians to describe the combination as a distinct disease, under the name of cataleptic ecstasy; but it is, in fact, one and the same disease, presenting itself in a somewhat different form, in consequence of the concatenation of circumstances.

Cataleptic ecstasy, or complicated catalepsy, according to the term which may be applied to it by different physicians, differs from the simple form of the disease, principally in there being some degree of consciousness still remaining, and the muscles continuing more or less rigidly contracted, or only partially relaxed. Still catalepsy can, even under these important and extensive modifications, be readily detected; for the consciousness of external objects is still suspended, and voluntary, if not reflex motion, is abrogated. There is also a high degree of mental excitement and abstracted contemplation attending this form of catalepsy.

This form of cataleptic disorder is induced by the same excited states of the mind as the simple variety,—love, fear, grief, rage, profound and sustained meditations, especially on religious subjects, excessive study, habits of contemplation; in a word, those influences which are most capable of causing strong excitation of the cerebral functions, are those which generally produce this disease in individuals with a tendency to hysteria or mania. The patient seems suddenly mentally struck, or carried away from all external objects; either standing or sitting in a most excited and impassioned position, with the eyes fixed and open, and sometimes uttering either the most enthusiastic and fervid expressions, or the most earnest denunciations and warnings, or the most absurd exclamations, with the feeling or belief of their reality, and total abstraction from, or unconsciousness of, all surrounding objects or persons.

It is understood that many of the Italian improvisatori are deprived of this faculty when in a state of health, but possess it whilst they are in a state of ecstatic trance, similar to, if not identical with, this variety of catalepsy. The effects produced on very nervous persons by the practisers of animal magnetism are also nearly allied to this affection; but that phenomena, such as the following, ensue from such excitations of the nervous system, appears impossible.

Dr Petitin of Lyons published, many years ago, a case of cataleptic hysteria, of which the following is a brief account, as given by Dr Petroz in an article in the Dictionnaire des Sciences Medicales, (tome iv. p. 282): "During the paroxysm, the cataleptic individual referred all her sensations to the region of the stomach. This was also the seat of the senses, for thither was touch, smell, taste, hearing, and vision transferred. There she enjoyed the most extreme sensibility. According to the report of M. Petitin, she distinctly saw her internal organs; determined with great precision their form and their movements; announced the periods when the attacks would return, their duration, as well as the phenomena with which they would be accompanied. What was perhaps more extraordinary, was the phenomena induced by placing the individual in magnetic relation with herself; for if the fingers were then applied to the *scrobiculus cordis*, or to the great toe, and a question asked in a loud voice, an intelligent reply was at once given. Although the objects employed for exciting sensations were applied to the epigastrium, or to the extremities of the fingers or toes, yet she constantly referred the sensation to the seat of the sense excited, at the same time stating the pleasure or the pain which the impression had made; for example, mastication was excited, when agreeable and savoury substances were placed on the epigastrium."

Since this extraordinary case was brought before the public, a great number of others have been recorded, either similar or differing only in some slight circumstances. In all, there is much reason to fear that imposition was practised; yet many are vouched for by men whose veracity in other matters is undoubted, and therefore I have admitted these phenomena without attempting to determine how far they are founded on truth.

Duration and Termination of the Attack.—The cataleptic paroxysms last a longer or a shorter time in each individual case. Generally, they do not last longer than some minutes or a few hours. There are not wanting cases, however, in which the duration of the paroxysm extended over a period of many days. There can be no doubt that the fit sometimes lasts three or four days; but how far the statement of Vial, that he has known the attack to extend over a period of thirty days, is deserving of credence, cannot be determined.

Whether the paroxysm last a longer or a shorter time, it in general terminates suddenly; sometimes the patient returns to consciousness, with the appearance of having been in a state of profound sleep. In every instance, the patient has no recollection of what has passed during the paroxysm; if wounds have been made to establish the fact of insensibility, the patients wonder at their existence, as their ideas immediately revert to the period immediately before the paroxysms. Indeed, this occurs to such an extent, that a patient who was speaking at the moment when rendered cataleptic, has, on recovering his consciousness, concluded the sentence which had been brought to such an abrupt termination.

The paroxysm is sometimes followed by other diseases of the nervous system. Delirium, convulsions, epilepsy, and confirmed insanity, occasionally result from or follow it. There are also cases on record in which the issue has been melancholia or apoplexy, and even tetanus, or a state approaching very closely to it. The most frequent termination of the disease, where health is not established, is hysteria, which followed very severely in the case of catalepsy, which I attended in Dundee under the late Dr Carruthers.

Catalepsy, however, is essentially an intermittent disease, its paroxysms being renewed more or less frequently; and where this has occurred over any considerable period of time, the fit is induced by the slightest cause, such as unexpected noise, a slight fit of passion, and the like. Sometimes the patient has many attacks in one day, or only one a-day, or every two, three, six, or eight days, or months, according to circumstances.

Between the paroxysms the individual sometimes enjoys good health; but in ordinary cases he suffers from cephalalgia, especially at the back of the head, from vertigo, from great excitation of the animal spirits, from embarrassment or confusion of ideas, from melancholy, convulsive twitchings of the limbs, palpitations of the heart, and from great nervous excitability. All of these ailments do not exist in each case. Those which are most frequently complained of are headach, and fatigue, and lassitude. The patient is also occasionally unable to sleep at night, or if he sleep, his rest is disturbed by dreams. Sometimes he sighs, laughs, or weeps, without any cause, and, in some rare instances, is affected with deafness or loss of voice. The appetite is usually diminished, and digestion is not easily performed. The patient is, in general, pale and emaciated.

If the patient be a female, the menses are generally found very irregular, both as to quantity and to time.

The only other observation I have to make on the terminations of the disease is, that after the individual has sustained numerous paroxysms, it is sometimes cut short and removed by hæmorrhage,—either from the nose, or, as occurs most frequently in women, from the uterus,—epistaxis, or menorrhagia.

Pathology.—The exact condition of the encephalon and spinal cord in cataleptic seizures has never been, and probably never will be, satisfactorily determined. The difference in the temperature of the head and of the rest of the body, in some cases, and also the strong pulsation of the carotid arteries, sometimes observed, would point to a state of congestion,—as the pathological condition of the nervous centres during the paroxysm indicates,—but whether this congestion is of an active or passive nature, is not known.

The vessels of the brain and cerebellum have been found much congested with black blood, and slight extravasation also, in a case that had terminated fatally. Fibrinous concretions have also been found in the longitudinal sinuses. But our knowledge derived from post-mortem examinations is not sufficiently extensive to allow us to consider a congested state of the vessels as common.

Catalepsy is undoubtedly more a lesion of function than of structure. The close approximation of its symptoms to severe hysteria shows that those two morbid affections are closely related; and the circumstance that the paroxysms of either are produced by the same causes, would tend to support the hypothesis that they are merely forms of one and the same disease. In hysteria the muscles are convulsed clonically,—that is, with motion; in true catalepsy they are convulsed tonically,—that is, without motion; and in this rests the principal difference between the two.

The nervous system, or rather centres, have their functions in abeyance during the paroxysm,—there is, in fact, a triple lesion of sensibility, of intelligence, and of muscular motion.

Although it is impossible to define or determine the nature of the cerebral disorder in this disease, in true cases of simple catalepsy, in consequence of but few cases terminating fatally, yet it has been noticed, that the state of congestion of the brain is distinctly traceable where individuals have died of catalepsy complicated with mania. In two cases of this kind, given in the Dictionnaire de Medecine, the brain was found in one much injected with blood; the grey matter on the surface of the convolutions was firm and had a roseate hue; the medullary substance presented a large number of mouths of vessels gorged with blood; and the *corpus callosum* was softer than usual. In the other case, the grey matter was observed to be of a dark colour, approaching that of violet, and the medullary substance presented the *puncta vasculosa* large, numerous, and filled with blood. It must be remembered, however, that the same pathological phenomena are observed after death from true uncomplicated mania.

Diagnosis.—This disease has been confounded with hysteria, ecstasy, asphyxia, apoplexy and syncope, tetanus, and the state of death. The older physicians also mistook death from cold for catalepsy, and described cases of soldiers in a state of catalepsy riding into the camp on horseback, firmly seated like statues on their saddles. Here, death from intense cold formed a source of error.

Although our knowledge of the distinctive marks of the diseases liable to be mistaken for trance is now so great that no physician ought to fall into error, yet it is necessary to notice briefly the signs by which a correct diagnosis may be made.

1. From true ecstasy, catalepsy is distinguished by the patient labouring under the former disease being occupied in profound and sustained meditations. The faculty of thought, instead of being annihilated or suspended, is found exclusively directed towards the contemplation of a single object, entirely absorbed with one idea, with some imaginary pleasant object, the powers of imagination being augmented by an enthusiastic exultation. Again, there are no convulsive movements, no rigidity, partial or complete, of the muscles; and, above all, the limbs, if placed in any position by the physician, do not retain that position as they will in simple, and oftentimes in complicated, catalepsy.

2. Catalepsy is distinguished from hysteria by signs which have been noticed when speaking of the pathological nature of the disease. In hysteria the muscular system is oftentimes strongly convulsed, and motions are performed; but the most

distinctive sign is the non-retention of any posture in which the patient may be placed.

3. Asphyxia is accompanied with suspension of the functions of respiration and circulation; the countenance is also ordinarily livid and swollen, the mucous membrane of the lips having a very dark hue.

4. Syncope is distinguished from catalepsy by the state of the muscular system, the limbs being extremely flexible,—and this appertains also in a great degree to asphyxia,—and by the general palor of the countenance and surface of the body, consequent on the suspension of the heart's action.

5. Apoplexy is known from it by the stertorous or sonorous breathing, by the more or less profound lethargy, by the lax state of all the muscles of the body, and also by the co-existence of paralysis.

6. Although tetanus has been mistaken for catalepsy, in consequence of the tension and rigidity of the muscles, yet, the fact that neither sensibility nor the intellectual functions are interfered with, should have prevented such a mistake from being committed.

7. Patients labouring under an intense and prolonged paroxysm of catalepsy have been supposed to be dead, and have been interred alive.

There are numerous cases of this kind on record, and many more where the individuals, after being laid in their coffins, have fortunately recovered from the attack before the period of interment. In such cases, respiration is insensible, and the heart's action is almost in abeyance; the surface of the body is nearly cold, and presents the palor of death; and the articulations are stiff. Although it is no doubt a difficult task to distinguish this state of trance from the state of death, yet a careful examination of the body, and time, would lead to a correct diagnosis. The limbs after death are first lax, then stiff, and ultimately lax again. The stiffness of the limbs, known as the cadavern rigidity, or *rigor mortis*, lasts for a longer or shorter time, according to circumstances; the sooner it supervenes, the shorter is its duration, and conversely. Now the stiffness of the limbs accompanying this intense form of trance, supervenes at once, and lasts as long as the paroxysm continues. This is consequently a valuable diagnostic sign.

Again, as the heart's action most certainly continues in a slight degree during the attack, the stethoscope may be used with advantage to detect the impulse and murmurs. The state of the eyes and the expression of the countenance, as well as the circumstances that the temperature of the body may be sustained in a slight degree, also furnish means by which a diagnosis may be made.

If pressure be made on the eyeball a few hours after death, the cornea becomes opaque; and this occurs invariably. But if the least spark of life remain, that effect would not be produced. This may therefore be said to be a sign at once distinguishing the state of trance from that of death,—one of ready application, and thus rendering wholly unnecessary the carrying out of the suggestion that inhumation should never be proceeded with until the body has shown unmistakeable signs of decomposition.

Catalepsy is a disease which is often feigned, sometimes for the purpose of exciting the sympathies of the charitable, occasionally by soldiers to procure their discharge from the army, often by females in good circumstances merely from a desire of creating an interest in their behalf, and by itinerating mesmeric impostors. To detect the imposition is oftentimes a matter of great difficulty, all the symptoms and signs of trance being exhibited with great truth. Such persons require to be carefully and vigilantly watched, and their character inquired into, when some inconsistencies will be noticed, and the imposition detected. Perhaps the inhalation of chloroform, where malingering is suspected and is necessary to be known, would be of great service. However slowly the individual breathed, the anæsthetic effect of this fluid would be produced; and then, if he did not speak or move while the effect lasted, it is more than probable that he would do so on recovery. This is merely thrown out as a suggestion, which I believe may be used successfully in most cases of malingering.

Prognosis.—The prognosis to be given in cases of cataleptic seizure, whether simple or complicated, must depend on a variety of circumstances, requiring judgment on the part of the practitioner. The age of the patient and collateral circumstances require attention. Young individuals, and adults, who, as already stated, appear more liable to attacks of this disease than those of a more advanced age, generally recover, both from the paroxysms and ultimately from the malady. The termination of the disease is usually favourable in young patients, but those who happen to be attacked with it at an advanced period of life generally succumb under it, or under the complaints which it engenders, epilepsy being understood to be the most common of these. It is stated that old people become afflicted with great melancholy, which leads them to avoid society and plunge into the most profound meditations, and derive from this greater pleasure than they can enjoy under other circumstances. Such individuals usually present a series of interminable paroxysms, which ultimately produces an attack of apoplexy, from which they seldom or never recover. The same also occurs in the greater number of diseases known under the generic term of NEUROSES, which do not present any fixed character, nor any regularity in their period of duration, so that, in such cases, the diagnosis will be governed by the principles laid down for our guidance in such diseases.

The prognosis will also vary according as catalepsy may be simple or complicated, or merely symptomatic. It has been already stated that the diseases which most frequently occur in conjunction with and complicate it are, hysteria amongst females, and in both sexes hypochondriasis, melancholia, mania, and epilepsy; consequently the prognosis will be regulated by the modifications induced by the complicating malady in each particular disease, and more especially by the amount of danger usually apprehended from it when appearing by itself. In symptomatic catalepsy it is indispensably necessary that attention should be paid to the nature of the complaint of which it is a symptom or which gives rise to it, and to note how far such disease is answerable to therapeutic measures. When catalepsy declares itself during or subsequent to acute diseases, as inflammations and fevers, the patients are then in considerable danger, and not unfrequently yield under the shock to which their system has been subjected.

On the whole, it would appear that catalepsy is not to be esteemed a dangerous disease, although many cases terminating fatally have been recorded. These, however, were for the most part complicated by other diseases, and do not give any support to the opinion of many of the older authors, among whom Boerhaave must be included, that it most commonly terminates in death.

Treatment.—During the paroxysms, the state of congestion of the head, if well marked or suspected, indicates the use of the lancet, the application of cold evaporating lotions, and even of ice, to the head. If blood be drawn, it may probably be best done by opening the external jugular vein or the temporal artery, because the circulation in the limbs is but slight. There is no rule laid down for the place in which venesection or arteriotomy should be performed; but looking at the symptoms attending the attacks, the available parts about the head and neck would probably be best. French physicians recommend the employment of leeches or cupping, rather than the lancet, because the power of the system is not so much depressed, while the local effect is produced. The leeches are applied by them to the interior of the nostrils, the feet, the thighs, and the head, in small numbers, and at intervals of a few days.

After blood-letting, either general or topical, cold applied by means of lotions or ice to the head, has been found to diminish the duration of the attacks, and, it is stated, even to cut them short, and to remove the rigidity of the muscles after the other symptoms have passed off. The cold bath is believed to be injurious, as might be anticipated, but hot baths and pediluvia have been found useful. The most effective treatment is now believed to be hot pediluvia, and the cold douche applied to the head at same time.

Such are the measures usually employed to shorten the duration of the paroxysm, but otherwise little or nothing can be done. The patient cannot swallow medicines; nor should any attempt be made to administer them, as they may pass into the respiratory passage and induce asphyxia. If there should be any sensibility remaining in the lining membrane of the nose, ammonia and other stimulants might be applied, held near the nostrils; but it should be borne in mind that their long-continued application, when the powers of the part are greatly diminished, may lead to inflammation and other disastrous results. Friction of the surface of the body with rubefacients might be useful, by recalling the circulation to its wonted channels, and thus relieving the nervous centres. Stimulating enemata might also be of service, by relieving the bowels, and acting as a stimulant to the circulation in the part.

Whatever may be done by the practitioner during the paroxysm, little is to be expected towards accomplishing a cure. It is during the intervals between the attacks that therapeutic remedies are likely to be of any avail. If the disease be symptomatic, means must be used to remove it by the employment of such medicines as the circumstances of the case may require; indeed, the treatment may be summed up in a few words. The cause must be searched for and removed, if it be possible. If a hemorrhoidal hemorrhage has been suppressed, leeches must be applied around the anus. If there are worms in the intestinal canal, anthelmintics must be administered to remove them. Again, if the disease be caused by the retropulsion of an exanthematous eruption, everything must be done which can remove the irritation caused thereby.

The state of the alimentary canal must be attended to in all cases; and particular attention must be paid to the menstrual flux. As hysteria and catalepsy so closely resemble each other, and as in both the menses are irregular, the physician will take care to employ those measures which the particular circumstances of the case may require. The fact that many cases are cured by nature through an inordinate flow of the menstrual fluid, points out important indication in practice, namely, that the uterine and other evacuations are to be carefully attended to, and, if deficient, the usual therapeutic agents administered to cause an increased flow.

The class of medicines called antispasmodies are oftentimes of great use, by removing the great nervous excitability, and increasing the tone of the nervous system, and, therefore, should be employed in all cases where the judgment of the practitioner shows them to be indicated.

Where there is much attendant debility, nourishing diet and the moderate use of wine or fermented liquors would be of great service, by increasing the general tone of the system, and preventing the tendency to passive congestion which always accompanies a weak and debilitated constitution. This is to be looked to in all cases, but more particularly if the patient be aged.

When the attack is prolonged, sustenance must be given through the rectum or an œsophageal tube. This is not rendered necessary in the majority of cases; but there are instances on record where the catalepsy was complicated by monomania, and the patient has remained so long in a state of abstracted contemplation, that it was absolutely necessary to convey food into the stomach in order that the patient should not perish through inanition. Some individuals have been fed in this manner for months.

In all obstinate cases, and when cataleptic ecstacy occurs from complications with mania, melancholy, and epilepsy, ptyalism may be advantageously induced by the use of calomel, and should be kept up as long as the practitioner may think proper; counter irritations, as blisters, setons, the moxa, and even the actual cautery, may be called for.

Janet Blackie, aged nineteen, a domestic servant, in Perth Road, Dundee, was, on the 17th June 1842, while waiting table, suddenly struck dumb, and remained motionless, with a spoon in her hand, retaining the posture she had assumed at its accession for above twenty minutes, and, on laying it down, resumed the subject she was pursuing as if nothing had occurred, and without any knowledge of the circumstance had her mistress not spoke to her regarding the fit.

My friend, the late Dr Carruthers, of Dundee, was consulted, and, as the catamenia were deficient and irregular, he prescribed ten drachms of tincture of cantharides and six of the tincture of muriate of iron; to take fifteen drops three times daily in cold water, and two of the pills of myrrh and aloes every alternate night, with hot pediluvia. These means were employed without any good effect, as she had an attack the longest ever she had four weeks after the first one.

When I saw her, the eyes were slightly dilated, the extremities were deadly cold, the face white as polished marble, muscles not distorted, pulse at wrist imperceptible, motion of the heart scarcely to be felt, respiration was slow, and, as it were, only a step between this imperfect state of life and death. She remained perfectly motionless, and during the continuance of the paroxysm retained the attitude she had assumed at its accession. Whatever position the limbs were placed in, they remained so. The time passed in the fit was to her annihilated. The last idea she had before the commencement of the attack was the first that occurred after its cessation. The paroxysm this time lasted three hours.

Cathartic medicines were freely administered, and as she afterwards showed symptoms of hysteria, I ordered twenty-four minims of oil of valerian, and one drachm and a half of the mass of aloes and assafœtida, to be made into twenty-four pills, one of which was to be taken night and morning. At the same time I directed exercise to be taken in the open air.

Next month the catamenia flowed freely, and she had no new attack for eight weeks, and at this time the fit was slighter, continuing only a few minutes. The fits nevertheless returned several times, and she became so nervous and depressed that she left her situation.

Dr Carruthers thought that the case ought to be treated in a manner similar to epilepsy, and suggested the use of nitrate of silver. This metallic salt was tried along with antispasmodics without any apparent effect. Powerful stimulating enemata of turpentine and assafœtida seemed to have some influence in shortening the affection.

Ten months after the attack there was considerable pain on pressure on the ninth and tenth dorsal vertebræ, and cupping and blistering exerted no permanent beneficial effect. I then applied the actual cautery during a fit, unknown at the time to the patient.

Since this application she had no recurrence of the fits, and is now enjoying good health, although occasionally suffering rather severely from cephalalgia and hysteria.

Leith, September 13, 1850.

ART. V.—*Case of Catalepsy, with Remarks.* By JAMES STARK, M.D., F.R.S.E.

CATALEPSY being one of those very rare diseases which few practitioners have seen, and still fewer had an opportunity of treating, the following case, which came under my care in 1836, may not be deemed unworthy of notice.

Mary Smith, a delicate and interesting looking child, with blue eyes, a pale complexion, fair hair, and of a scrofulous family, had, from her fourth year of life, been observed to take what were termed fits. When about nine years of age (being an orphan), she was taken into the house of a shoemaker to assist in keeping the baby. On the 3d of August 1836, when amusing the baby at the window, and leaning over it, one of these fits came on her, when she fell into the stable lane, into which the window looked, from a height of two floors, and lighted on a dung heap. Her fall was broken by one of these poles with ropes for drying clothes, which stretched out from the window of the floor below that from which she fell, so that, with the exception of a few slight bruises, she sustained no material injury. It was on this occasion I first saw her, shortly after she had been carried up to her bed. She was still in what her neighbours called the fit, which I instantly recognised to be that described as true catalepsy.

The face was calm and placid, and little altered in colour from what a delicate child would exhibit,—perhaps, if anything, somewhat paler. The eyes were open and fixed, the pupil dilated, but not unnaturally so; and with great sluggishness very slightly contracted on the application to the eye of the light from a candle. The whole limbs and body were rigid; but it was not the rigidity of convulsions or spasm, or cramp, but a nearer approach to that which follows death. In carrying her up from the stable lane, her limbs had been bent in various positions, and, as she lay in bed, both arms and one of the lower extremities did not rest on the bed or receive any support, yet continued motionless, as if at perfect rest. The fingers were not clenched, but in an easy position of half flexion; and when straightened, and held for a moment in the straight position, they remained so. The limbs were with some difficulty bent, but when made to assume any new position, there they remained, stiff and motionless.

The breathing was almost completely arrested, so much so, that it was some little time before I could convince myself the breathing was not altogether stopped. It seemed to be carried on entirely by the diaphragm. The halitus of the breath stained a looking-glass slightly, but the respiration was so gentle and slow, that it required the greatest stillness in the apartment, and an acute ear, to detect the faintest respiratory murmur, by means of the stethoscope. The pulse at the wrist I could not at first detect; even in the larger arteries it was exceedingly feeble. The stethoscope, however, made evident that the heart was beating regularly, but feebly, at the rate of seventy beats per minute. The heat over the body was, if anything, rather lower than natural, and the skin soft.

When examining her, the fit went off, and she returned to consciousness as quietly as if waking out of a gentle sleep. There-was no approach whatever to any convulsive motion, nor any hysterical sighing or sobbing. The pulse and respiration rose together till they became natural. There was no flushing of the face —no headach—no uneasiness complained of in any part of the body. But the fit once off, she felt as well as she ever did.

On inquiring into the history of the case, it was ascertained that she had been subject to these fits since about the age of four years, but they came on without apparent cause. At first the fits were only excited on her being irritated or frightened, but latterly they had so increased in frequency, that a day seldom passed without her having two or three. Her appetite was said to be irregular, but generally bad, and her digestive powers feeble. The bowels were said to be irregular, sometimes costive, at other times loose.

Wishing to see the phenomena attending this very rare and singular disease, I called several times daily on this case, in order that I might observe the accessions of the fits as well as their course, duration, and cessation; and I delayed commencing any plan of treatment until I had satisfied myself as to the probable seat or cause of the affection.

The result of my observations was that the cataleptic fit came on without being preceded by any sensible premonitory symptom. There was no previous flushing of the face, no *tinnitus aurium*, no creeping sensation in limbs, no sensation of fulness in the head; but, in the midst of her play or work, she quite suddenly became rigid, and frequently so instantanteously, that she had no time to sit down, or lay out of her hand anything she held there. The peculiarity of the fit, as distinguishing it at once from all others, was, that she did not fall down while in the fit, but if seized standing, she remained there fixed and steady, like a statue, and did not lose her balance. If seated, she became fixed there. But in both cases, if thrown off the balance, not the faintest attempt at an effort to save herself was made, and, if laid down, she maintained, till the fit was over, the very posture she had been in when seized. When the fit was off, the child was tolerably lively, was quite intelligent, possessed all her senses in perfection, and, in fact, was like other children, only less disposed for play. She was easily fatigued, evidently suffered from imperfect digestion, had a slightly-furred tongue, with a pale, soft, or glutinous and glassy appearance, indented slightly on the edges by the pressure against the teeth; and the dejections were frequently clay coloured. The abdomen was fuller than natural, and gave a doughy kind of sensation to the hand when pressed on it. No enlargement of the liver or spleen could be detected. The urinary discharge appeared natural, though, occasionally, it exhibited a tendency to throw down phosphatic deposits; at other times, on standing, an oily looking scum was formed on its surface.

After a fortnight's observation of the disease, I began to administer medicines for its removal. As almost all the recorded cases of this very rare affection appeared to me to be but varied forms of hysteria (*cataleptic hysteria*), which, indeed, in many, if not most cases, passed into or alternated with true hysterical paroxysms, it was quite apparent that I had to deal with a very different affection, and one which required different treatment. Hysteria and cataleptic hysteria never make their appearance till about the age of 17 or 18 years,—till the menstrual period of life. This child had been subject to this affection from the fourth year of life, and was at this period only about 9½ years of age. She had not, therefore, arrived at that age at which hysterical symptoms have ever been observed, nor did she, during the presence of, or when recovering from a fit, present any tendency to paroxysms resembling hysteria. In fact, the case, in its mode of attack, in its attendant symptoms, and in the age of the patient, seemed to be more allied to *chorea*, though all the diagnostic marks of that disease were absent.

As there appeared to be no determination of blood to the brain, no symptom which could be construed into an indication of any inflammatory or congestive state of the brain or membranes, it seemed unnecessary to make applications to the head, either in the shape of leeches, blister, cold or evaporating lotions. But, as the whole physical symptoms present indicated a deranged state of the digestive organs, such as I had often seen in chorea, it was resolved to follow such a course of treatment as should, if possible, restore these to a healthy condition, before any specific or other remedy should be given, with the view of acting specifically or otherwise on the nervous system.

The powder of chalk with mercury, in combination with rhubarb and magnesia, was, therefore, given in small quantities every night, and the bowels freely acted on every other day by means of jalap powder or senna infusion. The food was restricted to well boiled porridge, morning and evening, with sweet milk, and, for dinner, a small piece of fish or soft boiled meat. Broth, potatoes, and vegetables were strictly forbidden.

At the end of a fortnight, it was noted that she had passed two whole days without a fit, instead of having at least two daily. Her appetite had improved. The abdomen was not so protuberant, and the feculent discharges were more uniformly tinged with bile. She appeared more lively and active, and had scarcely such a pale look as before.

The same general plan of treatment was followed for several months, small doses of calomel (¼ to ⅙ of grain) or of ipecacuan,

being substituted for the chalk and mercury powder, or these altogether omitted for weeks, and small doses of rhubarb and carbonate of soda given daily.

On the 26th of December, it was remarked that three complete weeks had passed without a fit, and that she could now bear a sudden noise without its inducing one. The tongue was now perfectly clean and of a healthy aspect. Her digestion was good; she had a tolerably good appetite, was lively, and had acquired a little colour in her cheeks.

I continued to see her at intervals during the following year. From the beginning of the year, she only took occasionally the rhubarb and soda powders, but began to take daily 15 drops of the tincture of the muriate of iron. This medicine was continued regularly for months. On the 6th of June, it was found that three months had elapsed since last she had a fit, and it was brought on by the shock she sustained from seeing a woman fall down in an epileptic fit. 10th August, still no fit; and when last seen, on the 9th of November, I was informed she still enjoyed good health, and had experienced no relapse.

It may be useful to inquire whether the above case tends to throw any light on the pathology of this very rare disease, or on those to which it is so analogous, on many points,—chorea and hysteria.

If the theories of Dr Marshall Hall, on the reflex function of the nerves, had done nothing else than teach us that diseases may have two origins, one at the nervous centres and another at the extremities of the nerves, yet both these be indicated outwardly by the same set of symptoms, he would have deserved the lasting gratitude of the profession. This very theory appears to explain at once the discordant statements, as well as the success of the most opposite forms of treatment pursued in the nervous affections now under consideration. One writer, from having met with cases of chorea or of hysteria resulting from irritation at the nervous centres, and having treated them successfully on a plan adopted to this view, has hastily concluded that every similar affection must have a similar origin, and be amenable to similar treatment. Another, who had brought under his notice cases of these affections clearly traceable to derangement of the digestive functions, and treated them on a plan calculated to restore this function, has equally hastily concluded that he has solved the difficulty, and that all cases of chorea, hysteria, or kindred affections, will yield to the same plan of treatment. Both are unquestionably right, but both are just as unquestionably wrong; for my own limited experience enables me to state that certain cases will alone yield when treated by the one method, and others by the opposite. There are two distinct causes of all these nervous affections,—one depending on and caused by a morbid state or disordered function of the brain or spinal cord, the other depending on a morbid state or deranged functions of the digestive or uterine organs; the one acting through direct, the other through reflex action. There is no way by which one physician may show his superiority over another more than in diagnosing on which of these actions the symptoms depend, as on the correctness of his diagnosis rests the whole chance of a cure. It is of the greatest importance, therefore, in every case of nervous affection in especial, that the probable cause of the symptoms be discovered, before the remedies given for its removal mask or alter the peculiar features of the malady.

The above case in its whole progress seemed to depend essentially on disordered functions of the digestive organs, and the success of the treatment was a convincing proof of the correctness of the diagnosis. Had it depended on disease of the brain or spinal cord, lasting as it did for five years, there would have been present some symptoms which would have indicated organic affection of these nervous centres. But when the fit was off, there remained no loss of power in any organ of the body, no paralysis, no loss of any sense, no dulness of intellect.

Precisely the same is observed in most cases of chorea, though not in all. A child labours under the irritation of worms in the bowels, and an attack of choreiform symptoms may be occasionally observed. Remove the cause, and the child is speedily cured.

In most cases of chorea, long before the nevous muscular fits are observed, the bowels are deranged, the appetite irregular, the digestion bad, the child listless, the abdomen protuberant, &c.—all pointing out increasing functional disorder of the digestive organs. When this has continued a certain length of time, convulsive twiches are observed in various muscles, and at last the various incessant jerks, twitches, and convulsive motions of the face and extremities are noticed, which characterise the disease. This is the form of chorea which is so amenable to treatment by laxatives, regulation of the diet, country air, and exercise.

The other form of the malady is that observed to come on like chronic hydrocephalus, but rarely brought under the notice of the medical practitioner till the first stage has passed, and the parents' attention is called to the child by the presence of convulsive twitches, with partial, though it may be slight paralysis. In this form there is no time to lose, and unless the proper remedies are applied, and that judiciously and speedily, the disease becomes incurable, or the patient becomes a paralytic for life.

It frequently, however, happens that, from the continuance of the disease, there co-exists irritation of the nervous centres, as well as disordered functions of the digestive organs. These are the class of cases which require a mixed treatment.

I have been led into these remarks from the conviction of their important bearing, not only on the pathology, but on the therapeutics of the so-called nervous affections. The pure and uncomplicated affection with which I had to deal in the above case of catalepsy, and the success of the treatment adopted, not only served to prove the accuracy of the diagnosis as to its cause, but also seemed to prove that such an affection may last for years without involving the nervous centres. This is notably the case in hysteria, in which actual disease of the brain or spinal cord is seldom ever witnessed, and attention to restore the tone of the deranged digestion and secretions, rarely fails to effect a cure.

ART. VI.—*Upon the Structure of the Liver.* By A. RETZIUS. Report from the Transactions of the Royal Scientific Academy. January 1849. Translated from the Swedish by FR. CREPLIN. (Muller's Archiv. 1849. Heft ii. Seite 154.)

PROFESSOR RETZIUS exhibited a series of Preparations of the Liver from Man, the Dog, Cat, Rabbit, Squirrel, Hog, and Ox, which were injected with different coloured materials. He found confirmed in their chief circumstances the valuable observations by Mr Kiernan. After this anatomist several other inquirers, as Weber, Krukenberg, Theile, Schrœder Van der Kolk, and others, had occupied themselves with investigating the structure of this gland; but nevertheless much was still left in obscurity. Upon the question, how far the liver possesses a lobular structure or not? Professor Retzius had already expressed his opinion in the meeting of Naturalists at Copenhagen, namely, that this gland was provided with AKINI, or was lobular in fundamental structure and at the commencement, but that, amidst manifold changes, the AKINI, or lobules, might coalesce or be lost in each other; that thereby the lobular appearance is lost, yet may, under certain circumstances, return. It is proper to add, that he understands the expressions AKINI and lobules to be synonymous.

1. The preparations from the Human Liver were made from a child of six months. Before the injection of the organ manifest AKINI appeared; but in the injected preparations, in which the Capillary Veins were entirely filled, no trace of interlobular partitions or ligamentous alveoli was seen. The lobular formation ought to be exhibited uncovered through the white injection which was impelled from the *Venæ Hepaticæ* and their lobular branches into the central Capillary Veins of the Akini. The Akini were closely surrounded by the preponderating abundant perilobular capillary vessels from the Portal Vein; but this also gave no dis-

tinct limits to the Akini, as is elsewhere often the case. In several spots the lobular capillary networks were entirely filled from the Portal Vein.

It appears, from the preparation now mentioned, that even in the sixth month after birth, the Portal system, which during uterine life has formed a part of the system of the Umbilical Vein, possesses a degree of development which is much superior to that of the hepatic veins.

In large portions, especially of the right Lobe, the injection by the Portal Vein had completely occupied the whole parenchyma, with the exception of the interspaces which enclosed the network of the biliary vessels and the Centres, which the interlobular branches of the hepatic veins indicated. In other spots, the injection had not penetrated into the minute branches of the Portal Vein, whereas the branches of the Hepatic Veins, with the parts of the capillary network lying next to them, were well filled with it. These Hepatic Vein branches communicate to the same spots of the organ a lobular or Akinated appearance. This was particularly the case at the surface, where the round ends of the intralobular injected venous plexus were elevated in the form of small white knots; (the injection into the hepatic veins was made with white lead). The circumference of these was partly uninjected and was partly occupied by the network of biliary tubes. At the places at which the perilobular injection had entirely failed, these presented the appearance of lobules with large interspaces; but where the injection had fully succeeded, the interlobular small plexuses were almost covered by it. At the places at which the section was carried along the intralobular branches, the Lobules appeared, as Kiernan had represented, seated very close upon these branches (*Rami sublobulares*, KIERNAN), resembling in section, leaves without stalks, surrounded by capillary networks from the Portal Vein, and clusters of tubules from the biliary tubes.

Remarkably interesting, in well-injected preparations, are the extensive sheaths of the Capsule of Glisson, which accompany the arborescent ramifying divisions of the Portal Vein throughout the whole organ, where this vein gives off its perilobular branches. Professor Retzius had the opportunity of confirming, as to these sheaths, the remarkable fact,—which Kiernan, indeed, has very well announced systematically, but has not so well described in detail,—namely, that the biliary tubules in the walls of these sheaths form a network which is eventually continued onward to the lobular biliary tubular network. Every sheath of this kind from the Capsule of Glisson presents in section a broad larger diameter than the vessel which incloses it in dry preparations. These vessels are a larger Portal Vein branch, a something smaller biliary tubule, and a smaller Hepatic Artery branch, whose areas are also seen to be cut through. These Glissonian sheaths appear to be on the spots on which the observer ought to find the perilobular *septa*, providing they were visible and present. At the point at which the biliary tubes are well injected, the sheaths of which we now speak, appear like rings of the colour of the biliary tubes, and their walls covered or perforated by a biliary tubular plexus with equally small meshes, as are the meshes in the lobular biliary tubule network.

This vaginal biliary tubule network Kiernan certainly beheld, as he admits it in his Classification of the ramifications of the biliary tubes, under the name of VAGINAL BRANCHES, and applies to it the name plexus. From this Vaginal Plexus from the Biliary Tubes, there proceed in all directions, in the whole circumference of the Glissonian sheaths, Biliary Tubules, which, so to speak, are woven throughout through the Capillary Arteries, penetrate into the lobes, and, in this manner, as Mr Kiernan has represented, form at once a vaginal perilobular, and also a lobular expansion. The only circumstance which Professor Retzius has here to observe, as differing from the representation of Mr Kiernan, is, that he employs the denomination BRANCH for a tubular expansion, which is completely netlike, and in which, accordingly, there can be no question of either trunk or branches. The regular division of branches from the Portal Vein and the Hepatic Artery, which so often, in other instances, form the ground plan, as it were, for the polygons surrounding the lobes, was not present; but the perilobular vessels appeared particularly as a network, and in the larger branches followed no regular or perilobular type.

In two other specimens, both from children of three years, lobules with hexangular sides appeared very neatly. In the one the injection of the hepatic artéry had been peculiarly successful. Besides the fine, long-streaked branches at the surface of the organ, each lobule had its proper capillary, perilobular network of extreme delicacy; but in none did the network of the Portal Vein appear very distinctly, because also in this instance the injection had penetrated into the network of the lobules, and thus the Periphery was less distinctly visible. In one of these preparations, the perilobular part of the Portal Vein appeared, both three-branched, angle-branch, and also regular straight edge branch.

2. PREPARATIONS FROM THE LIVER OF THE DOG.—In these also there appear no alveolar ligamentous partitions round the *Akini*, which, as well as in the fore-mentioned preparations, are confounded with each other. Meanwhile, they are still more distinctly observed issuing from the division of the small branches of the Portal Vein; a peculiar arrangement of these, disposed

round the edges at which the surfaces of the coalescing Akini meet. From these are formed small five to six-edged Lozenges, or Polygonal figures rather,—for the most part with a gap or trench on one side. Every figure of this kind indicates the circumference of an Akinus or Lobule, in the midst of which appears the intralobular branch from the Hepatic Vein. In each angle of this five or six-sided often irregular figure, lies a something thicker branch, which is stretched after several turnings upon the edge branch of the same mentioned figures. If we name these Edge branches or Marginal branches, we must then call the larger branches lying in the angles Angle or Corner branches, because they lie there where the angles of the lobules coincide. These angular branches are what form the so-named asteroid vessels, in which the branches pursue certain determinate directions in order to reach the edges of the lobule. Mr Kierman, who also mentions VASA STELLATA, remarks very correctly, that this denomination has arisen from preparations which were imperfectly injected. From these proceeds a small number of more minute branches, which speedily pass into a thick net of capillary arteries, which meet in the lobules and are united with the capillary network from the central intralobular branches rising from the hepatic veins, and lying in each lozenge-shaped figure. These united networks are the vessels which Mr Kiernan names the lobular branches, but which, if rightly denominated, should be designated as lobular networks. This Network is first injected at the surface of each Lobule, and ought therefore to be called the *perilobular*, or probably, rather the alveolar Network.

Each angular or corner branch is accompanied with an artery, which, in a neat spiral manner, winds round the Portal Vein branch. This arrangement, THEILE mentions as taking place in the human liver, but he has not been able to find the same in animals. The arterial branches follow in other respects the marginal edges of the Portal Vein, while each spiral turn is more extended, and disappears.

Besides that the arterial branch and the biliary tube accompany the angular branch of the Portal Vein, they are inclosed in the dog also by biliary net sheaths, and these biliary nets extend in all directions through the meshes of the Venous network throughout in the lobes.

Professor Retzius could not, however, in the dog discover Vaginal Biliary networks so determinate, and lying in regular cylindrical or prismatic planes, as in Man and several other animals. The lozenge figures, or polygons, which denote in the dog the lobules of the liver, are very small.

3. THE PREPARATION FROM THE CAT'S LIVER shows *Akini* of nearly the same size as in the dog, which, in like manner, are

confounded with each other without ligamentous alveoli or partitions. Their shape is for the most part determined by the position and distribution of the sublobular branches of the Hepatic Veins. At the spots at which the surface crosses over the end of the intralobular veins, the shape of the lobule is for the most part regularly five or six-edge rounded. Where it runs along a similar intralobular branch, it is oblong, and presents several forms or faces, according to the greater or less inclination of the branch towards the surface.

In the injected state it is further the arrangement of the perilobular branches of the Portal Vein which circumscribes the lozenge-figures. The marginal veins, if it be permitted to use this expression, which has been defined in the foregoing observations, are here more difficult to be seen clearly, because they are mostly surrounded by capillary networks, which proceed almost immediately from the same veins. These capillary vessels were in several places so well injected, that the mass had not entered the lobes themselves, in consequence of which they appeared to form walls round about the Akini. They presented the appearance as of red, injected, polygonal, capillary network *alveoli*, and resemble the many-sided cells in different cell-formed plants. In several spots of the preparation the intralobular capillary branches were also filled; but in these spots the Periphery of the lobule could be known by a more dense vascular formation, and are strengthened by thicker branches. The angular branches at the angles of the lozenge figures are not so distinctly marked and manifest as in the dog. The sublobular and lobular branches of the Hepatic Veins admit with considerable regularity the centres of the Akini-Lozenge figures, and show, as was indicated, a different form according to the difference of their position towards the surface, but are almost all alike in this respect, that they pass without any peculiar ramification at once into capillary networks, which possess in the small trunks something larger areas than further on, where they reach the capillary veins, which at the circumference of the lobule proceed from the system of the Portal Vein.

Of the biliary tubule branches only very few, and these very fine, could be discovered, whereas the injection of the fine netlike distribution of these ducts was so much more manifest. In some, though fewer angle-ramifications, between the lozenge figures appeared sheaths from the Capsule of Glisson containing their usual venous branches, but no large biliary tubules could with any certainty be recognised in these sheaths. On the other hand, every similar small sheath showed a dense and regular biliary duct network, which was something finer both as to the diameter of the tubules and in its meshes than the venous network. The angular branches of the Portal Vein, which were so small that they were no longer surrounded by sheaths from the Capsule of Glisson, were again closely enclosed by biliary tubule networks. When the preparations were dried and placed in Canada Balsam, this did not enable the observer to distinguish more accurately, whether, as is not improbable, these biliary tubule sheaths also lie embedded in a matrix of ligamentous tissue. Further, all the perilobular venous networks, namely, the marginal networks and the angles of the lozenge figures, were perforated by fine bile-tubule nets, which in many places were so perfectly filled with chrome yellow, that they appeared to perforate also the lobular capillary tube network into the sublobular and central intralobular branches of the Hepatic Veins.

4. THE PREPARATION FROM THE LIVER OF THE RABBIT.—In this the AKINI lozenge figures were something larger than in the Cat and in the Dog. Towards the surface the majority appeared to be pretty regularly six-sided, and of nearly similar magnitude. Alveolar partitions from the Capsule of Glisson could not be discovered. Perilobular branches of the Portal Vein did not appear, notwithstanding that the lobular capillary network from the same vein was well filled with Cinnabar injection. The more delicate Hepatic Veins, as well the sublobular veins as the interlobular, presented a peculiar appearance. They are collectively drawn out longitudinally, and smaller than in the Livers of the other animals examined by Professor Retzius. The more minute branches proceed out at moderately wide distances from each other, generally after three turns, and indeed so shut up, that, viewed from the end, they are simultaneously united towards the trunk in three similar large angles. The Capillary networks, which proceed from the interlobular branches, go not directly off, but by short twigs. These capillary networks also have oblong meshes, and are greatly finer, by one half, than the network of the Hepatic tubules. The portion of the lobular network which goes off from the Portal Vein, is in like manner fine, but not drawn out longitudinally. At the surface of the Liver the intralobular branches terminate, not simply, but are parted a little before the surface into three branches, diverging or shut off at three almost equal angles, which branches pass into the capillary network tubes. These branches accordingly proceed obliquely from within outwards towards the surface. More deeply onwards the observer perceives them stretching across internally in a large portion of the AKINI, which, at the spots at which the intralobular branch enters, have a fissure or opening in the perilobular network of the biliary tubules.

Not less peculiar appears the distribution of the biliary tubules. The injection with chrome yellow was particularly successful. Smaller biliary tubule stems appeared only within the sheaths which inclose the vaginal Portal Vein branches. In other respects, the Biliary Tubules appeared partly as a Vaginal network, or such as that in the Vaginal processes of the Capsule of Glisson; they were woven round the branches of Portal Vein, partly as alveolar or perilobular net-work, which served as coverings to the many-edged mutually compressed AKINI.

As is above intimated, the finest Biliary Tubules have much larger areas than the capillary vein tubes; so also the meshes in the network of the biliary tubules are mostly round, and smaller than the diameter of the tubes. In consequence of this, the biliary tubule networks are easily known, and cannot be confounded with the Capillary network of the veins. As has been above intimated, each AKINUS is surrounded by thick network of biliary tubules, which enters through the meshes of the capillary network. As the Akini have sides with six borders, so every similar alveolar network of biliary tubes shows a corresponding form, or a polyhedral cavity bounded by fourteen six-sided planes. The network belonging to each side is distributed to Akini lying below each other; in each angle, three Net-planes meet at three similar large angles. Every similar angle forms a sheath, which, when cut transversely, presents in many places a three-sided, in others, one round area. In the six angles of each lateral plane, are found, in the majority, also six similar areas, which are those of the Glissonian sheaths, in the walls of which a similar network of Biliary Tubules, as is above intimated, is developed. In several places, the partitions of these networks of the biliary tubules are shown doubled, and might give reason for the idea of coalescence, or to the idea that each AKINUS was at first provided with its own Alveolar or perilobular Network, but that this by compression had passed into a common one. In many spots, however, the observer may distinguish that this appearance proceeds hence; that the section had met the vicinity of an angle connection, and that thus a vaginal canal had been cut or opened longitudinally.

5. THE PREPARATION OF THE LIVER OF THE SQUIRREL.—This shows very small lobules, of form little regular, and often confounded with each other, without being separated by completely enclosing vessels, and still less by proper partitions or distinguishing ligamentous alveoli. Within the liver the surfaces of the lobules are still less bounded, and often scarcely can they be known on transitory examination. Proportionally to this is the Division of the Perilobular branches of the Portal Vein. These proceed here from certain something larger branches, which, as in the rabbit, lie between the angles of the AKINI to three in each angle, and speedily pass into the Capillary Veins. They appear towards the surface of the divided, or undivided organ, as imperfect, six-sided figures, sometimes truncated, sometimes rounded,

the circumference of which is interrupted on one or more sides, so that the substance situated within passes immediately from one lozenge figure to the other. All the larger angular trunks are also enclosed by sheaths, which contain bile-tubule networks. Within the small organ the lobular appearance is almost lost by this circumstance, that the Venous Tree has there not been able to develop itself to its lozenge-shaped perilobular type. Here they twine round the small lobular and sublobular branches of the Hepatic Vein, as they may occupy least space. In many places in which the branches of the Hepatic Veins run obliquely or parallel towards the surface, small sublobular or intralobular twigs go off in the same direction; two or three more similar branches send off amidst each other small offgoing twigs, which advance with the extremities to meet one another. Hence the relation appears as if entirely inverted, so that the Portal Vein networks appear as if they were enclosed by twigs of the Hepatic Veins. This arrangement must in a certain degree be illusory, and may have arisen partly in the manner here indicated, partly through defects in the walls of the lozenge-figures as a consequence of the penetration of the branches of the Hepatic Veins.

The branches of the Hepatic Veins are, in proportion to the small organ, very large, and not very numerous. They pass quickly, after some few and short ramifications, into the capillary networks, so that under the microscope they might appear like small branches of sponges, or as if they were overgrown with moss. As has been above intimated, they meet those of the Portal Vein at the surface of the organ, regularly intralobular in the centre of the perilobular network. The long-drawn type which is observed in the rabbit is here wanting. The meshes are almost round and very small.

The injection of the bile-vessels was very successful. The proper branches accompany the Portal Vein branches, in the Glissonian sheaths of which, they, as in the previously considered forms of Hepatic structure, form dense nets. In the dry preparations from the squirrel, these sheaths could not be separated in any other way than were distinguished through those vaginal bile-tube networks. In general, where a small something thick Portal Vein twig is cut off, the observer perceives, in this manner, round its red area, a yellow ring, from which the yellow bile-tubule network is expanded upon the lobes. When such a part is cut off in the long direction, the observer sees the Portal Vein twig and the artery lying in a yellow sheath, and indeed not all together, but perforated by meshes, something like a network, or a knitted stocking. In some slices the observer might perceive that they were distributed in three directions to form, first, perilobular or alveolar networks, as in the liver of the rabbit. The thickness of the tubes forming this network is something less than that of the Capillary Blood-tubes; their meshes are something angular, roundish, and proportionally something thicker, so that they pass through the woven network of the bloodvessels as far as the meshes of that other network. The injection had perfectly filled each of the divisions of tubes with their respectively different colours, without the latter having mingled in any way with each other.

6. THE PREPARATION FROM THE LIVER OF THE HOG.—This has of all the most distinct lobules, which were something larger than those of the human liver, and were surrounded by proper alveolar investments from the Capsule of Glisson, as, already, Wepfer, Johan Muller, and the author, have shown beyond contradiction. In injected and dried preparations, the observer perceives from this, the Capsule of Glisson, alveolar parts describe clear interlobular lines, with several edges, mostly six-sided lozenge figures, round the lobules and between them. In the interspaces of the lobules, which interspaces are filled through the Capsule of Glisson, lie the more delicate trunks of the Portal Vein, the Hepatic Artery, and the Bile-tubes, and give off networks to the alveolar or perilobular parts of the Capsule, and from which parts they pass into the interior of the lobule.

In preparations, also, in which only the Portal Vein is injected to these alveolar tunics, the Capillary Network, as was abovementioned, in regard to the liver of the cat, form polygonal cavities of the shape of the small lobules. In the sides and angles of these lie small straight perilobular branches of the Portal Vein, which, after a short ramification lying on the plane of the *alveoli*, pass into Capillary networks. This formation takes place with nearly like uniformity through the entire organ, though the lozenge figures vary in size, and also more or less in regularity and shape. In consequence of this, the intralobular branches of the Hepatic Veins come out more regularly central in the liver of the hog than in the livers of the animals previously considered. These intralobular branches present the peculiarity, that only one of them is in each Lobule or Akinus, and this terminates obtusely rounded like a finger, and passes immediately into capillary networks. The bile-tubes, which accompany the branches of the Portal Vein, are thin, and their small twigs go off at wide distances from each other. The Vaginal bile-tubule networks, which surround the branches of the Portal Vein, appear only in few spots in the liver of the hog. In place of them, the observer beholds at the edge mostly of each lobule a delicate edge-bile vessel, which runs round about the angle and sides of the lobule, gives off, directly inwards, the fine lobular network of the biletubules, which is inwoven with the Capillary Veins. Consequently we have here again a perilobular, or alveolar and intralobular, network of bile-tubules for each lobule.

The network of the alveolar bile-tubules is dense, and preponderates over the light intralobular one. The canals of both have larger areas, but smaller meshes than the capillary nets of the veins. The perilobular or alveolar networks of the bile-canals are here more manifest in the small lobules, and inclose the *alveoli* from the Capsule of Glisson. These *alveoli* constitute together the interlobular substance of the organ, which may consequently be considered as equally forming *alveoli* round the lobules, and also partitions between them. Since, therefore, each lobule is surrounded by its own Alveolar network, and this appears externally in most places in section as a straight extended linear vessel, or as the edge of an alveolar wall, so there appear in each interlobular *Dissepimentum* two yellow vessels, one for each of the two lobules lying side by side with each other. The angles of the lobules are for the most part rounded. At the points where these meet, there are formed similar small Compartments, in which the *Dissepiments* coalesce; and these angular Compartments, if we may so name them, appear in general to correspond to the rounded sheaths of the Capsule of Glisson, which appear to be so general in the form of Liver previously described. In every angular Compartment of the kind now mentioned, are three, or sometimes several angles in the middle of the networks of the alveolar bile canals, upon one another, and they appear to press down the above-described networks of the vaginal bile canals.

In the Compartments and the Dissepiments which, in the manner mentioned, are formed between them, under and amidst the alveolar networks of bile vessels lying over one another, are lodged the vascular distributions and the alveolar networks of the Portal Vein and the Hepatic Artery. These are, so far as Professor Retzius could trace the matter, mostly undivided like the Capsule of Glisson, and indeed so that they form nets of Dissepimenta in such manner, that from each Dissepiment wall the Capillary canals run in opposite directions to two Lobules lying over each other. In this manner are the perilobular vascular networks all connected with each other; while, on the other hand, the bile-tubule networks lie within them like inclosed islands, a disposition of which the liver of this animal gives a beautiful view. It must particularly be remarked, that, although in the liver of the hog the lobules in general are well separated by proper inclosing bile-tubule network and ligamentous tissue, as also the vascular partitions (*Dissepimenta*), yet here and there are lobules which evidently consist of two or three lobules which have coalesced and grown together. The observer easily recognises this disposition, partly from the star-like shape, partly from this circumstance, that rudiments of perilobular networks are inserted within their nitches.

7. PREPARATIONS FROM THE LIVER OF A CALF.—The lobular division is indistinct. The distribution and the Capillary Network of the Portal Vein are predominant. These perilobular branches and Networks form only imperfect and irregular polygons. These are regulated after the form and Ramifications of the intralobular and sublobular branches of the Hepatic Vein. Only few proper branches appear in the perilobular capillary vessel network. The thick trunks are all surrounded by distinct broad sheaths from the Capsule of Glisson. In these sheaths the hepatic arteries form a long-drawn, thin-woven, something coarse network of an aspect quite peculiar. The Hepatic Veins proceed from moderately coarse branches into a thick capillary network of the same dimensions as those of the Portal Vein capillaries; but these capillary networks appear to run out in a particularly wheel-like manner in two directions opposite to each other, not equally round, like wings. The lobules of this Liver (the Calf's) are not well separated; but several of them hang together by the base round the end of one small vein, which for the most part is divided at its extremities into four twigs, one to each of the lobules lying under it. The limitation of these imperfect lobules is in the greatest number indicated only through the perilobular Networks, which there only surround the external apices of each separate lobule. At other spots appear still small irregular polygons of the Portal Vein capillaries, which inclose a central capillary net, injected from the Hepatic Veins.

The ramified bile-tubules follow the Hepatic Arteries, and are almost of the same size as these. They form equally vaginal, as perilobular and lobular network systems, as in the forms of livers previously considered. This preparation Professor Retzius saw not very fully illuminated; and he is desirous to make subsequently several injections and investigations with the liver in the Ruminating Animals, and also in several other genera. Notwithstanding he has been from time to time occupied with researches on this organ, it is still his opinion that he has scarcely advanced further with it than the beginning of the investigation.

The principal results of what has been ascertained may in the meantime be stated in the following manner.

1. That the Liver is in fundamental structure lobular; but that this lobular form is met with in many stages, periods of development, and retrogression, with coalition of the lobules into one mass, with more or less regular development of the ramifications of the Hepatic Veins, and similar varieties. The circumstance

which declares most strongly for the presence of the Lobular type is the persistence of the alveolar bile-tubule networks.

2. That the bile-tubes, completely with their walls, which correspond with the BASEMENT MEMBRANE of the English anatomists, are provisional canals; and without this they certainly could not have been completely injected with the regularity with which they are met in the preparations of Professor Retzius. Professor Retzius is also in the position to convince himself in the direct way of the presence of this membrane, and has found it entirely as it has been represented by Schrœder Van der Kolk, namely, as a simple membrane, which encloses both the marginated and the round liver cells.

According to the experience of Professor Retzius, this fundamental membrane of the bile-ducts allows itself to be presented in a sensible manner, by cutting from a liver which has been first macerated in Ether and then dried, thin slices, as Purkinje, Henle, and others have done with many tissues, and Middeldorpf has done with the duodenum.* These thin slices are then placed in water, by which they are rendered transparent. They show, then, the proper membrane of the smallest bile-duct tubes in simple outline, enclosing the cells already mentioned.

3. That Professor Retzius has found no arterial network in the sheaths from the Capsule of Glisson.

ART. VII.—*Upon the Structure of Rickety Bones.* By Professor HERMANN MEYER, in Zurich. (Muller's Archiv. 1849, Heft iv. Seite 358.)

[IN the following short paper on the Minute Structure of Rickety Bones, the author refers to passages in a previous memoir on the Structure of Cartilage and its Ossification.† It was our intention to have given first an abstract of the contents of that paper; but this our limits do not at present permit. Meanwhile, it may not be uninstructive to present Professor Meyer's inferences on the peculiarities of the Rickety bone, the more so, as, by comparing them with the observations of Mr John Dalrymple on the Structure of the Bones in *Mollities Ossium*, and the discovery by Mr Jones of a peculiar substance carried out of the system during the presence of that disease, some new light may be thrown upon the nature of these maladies of the osseous system. The observations of Professor Meyer are quite intelligible to those who understand the healthy structure of bone.]

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* Middeldorpf Disquisitio de Glandulis Brunnianis. Vratislaviæ, 1847.

† Der Knorpel und seine Verknockerung Von Hermann Meyer, Professor in Zurich. Muller's Archiv. 1847, Heft iv.

Upon the minute structure of rickety bones, two contributions have in recent times appeared ;—one by Kolliker,[*] and the other by Gurlt.[†] By neither author, however, has the subject been in any way exhausted; and it may be inferred that it can only be practicable to obtain an accurate conception of the nature of a pathological change in a process of animal structure, when we understand more accurately the normal process. After I had obtained, through the researches communicated in the Memoir on the Cartilages and their Ossification,[‡] a sufficient amount of information upon the process of normal ossification, I entertained the hope that I might understand more clearly the nature of the changes in this process in the state of Rickets. Meanwhile, two examples of very well formed Rickets accidentally occurred to me shortly after each other, in children aged two years; and what the examination of these cases taught me, I here communicate.

The Rickety bone is thicker than the healthy one, and it is in its joints very much compressed in breadth. It is also wholly or partially more or less soft and flexible. On making a longitudinal section of its cylinder, the following peculiarities are observed.

The medullary cavity is small, that is, shorter than it is wont to be. The periosteum is very much thickened, and the cortical substance lying deposited under it is very porous, but in all points thicker than in the normal state. It has, however, neither fewer nor more lamellæ than are proper to it; but the lamellæ are farther removed from each other than natural, and something thicker; in consequence of this, the observer may peculiarly well perceive, in the section of a rickety bone, in what manner the inner layers are shorter, and the external layers progressively shorter. Of this condition, Gurlt has given in his first figure a very good representation. Many times we find, more internally still, more compact cortical substance; while, externally again, it is more porous, which last, then, must, without doubt, have been deposited during the presence of the disease, after the first had been previously well formed.

In the neighbourhood of the joints, where the original cartilaginous incrustation of the bones is found in the process of ossification, the observer beholds between the sound cartilage, close to the joints and the spongy osseous substance, which denotes the termination of the medullary canal, a cartilaginous mass which presents in general the greyish jelly-like aspect which the cartilage is wont to present at the border of the ossification. The length, however, of the spot so circumstanced, is often from eight to ten times more considerable than in the normal state. In this spot are observed, manifestly, substances of three different kinds. First, there are found in the greyish transparent fundamental substance, spots, which appear brownish-yellow and opake, and here and there are also red-coloured. Second, in these spots, and also in the fundamental substance, are seen here and there whitish points. Thirdly, the yellowish opake substance oftentimes advances in a serrated form from the ossified part of the bone to the lamellæ of the articular end. The whole of the now described spots is very soft, and readily yields to pressure.

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[*] Mittheilungen der Naturforschenden Gesellschaft u Zurich. Heft i. 1847. S. 168.

[†] Dissertatio de Ossium mutationibus Rhachitidie effectis. Berolini, 1848. P. 19.

[‡] Der Knorpel und seine Verknoeckerung. Muller's Archiv. ut supra, Seite 292.

Microscopical examination sufficiently elucidates the cause of this peculiar appearance, and enables us so far to trace the changes in rickety bones, that they may be described in words. The cartilage passes, as in the normal state, through the changes which are wont to take place previously to ossification; and the formation of the medullary space proceeds in the same manner as in the normal state after these changes, *without, however, any actual ossification by deposition of calcareous matter thereby following*; only in individual points appears such ossification, and these are the above-mentioned whitish points; while the greyish-jelly-like fundamental substance is the cartilaginous mass, changed by the formation of parent cells; and the yellowish opake spots are those in which the formation of medullary space is exactly in progress.

We find accordingly in the grayish jelly-like substance the parent cells, which the cartilaginous edge usually shows at the boundaries of the ossification.

The differences from the normal state appear only in this, that the young cells are larger, that is, broader, and frequently contain again other young cells; hence the parent cells have a greater breadth. The intercellular substance between the parent cells is further more considerable and of a darker colour than in the normal state.

In the yellowish opake spots the observer perceives that here the formation of the medullary space proceeds according to the laws explained by me in the memoir referred to, regarding the formation of cavities in cartilage by the formation of fibres and by softening. Some spots the observer beholds entirely separated into fibres, and others which contain already large cavities, the walls of which are still covered with fibrous masses. In the yellowish opake spots mentioned as projecting in a serrated manner, there is in the interior constantly a large medullary space, and around this smaller spaces still in the course of development. Where the formation of the medullary space has commenced, the observer perceives, namely, in the immediate circumference of the medullary space, the cartilage cells, with thick walls, and at length non-nucleated, as is mostly the case in the instance of old cartilage cells. With the advancing formation of the medullary space, the thick-walled cartilage cells coalesce into each other, and with the intercellular substance, so that their roundish and star-like cavities only are visible. Spots of this kind have quite the appearance of bony substance which has been deprived of its earthy matter by immersion in hydrochloric acid, with the exception that they are darker.

In these completely morbid parts of the bone, ossification appears to proceed here and there in small points and streaks, as if it were making a series of efforts. If such ossification is found in the greyish jelly-like substance where the young cells lie still clear and with thin walls, it gives the whole the character of normal structure, because the intercellular substance impregnated with calcareous salts surrounds the cells like a network.

Where the cells have already run into each other, and have united with the intercellular substance, the calcareous salts are deposited in the masses formed of the two in common; while the observer cannot perceive an earlier ossification of the intercellular substance, or of the cells.

The same is the case where the cells are already provided with thick walls, but may yet be distinguished individually; only in very rare cases does the law hold good of the ossification of the adult cartilage through earlier ossification of the cells. The observer must not here be deceived, and take for a bone-cell one which is a cartilage-cell with thick walls.

In consequence of the formation of the medullary space, the parent cells are so much destroyed, that the observer can no longer distinguish their outline in the cartilage bodies between the medullary spaces.

The cortical substance of rickety bones shows, in its minute structure, entirely similar conditions as the original bony deposition. Want of calcareous salts also cannot be here mistaken, although it is not so conspicuous and not so considerable as in the spongy substance. We find the reticular connected bone corpuscles moderately abundant, and the meshes between them of average width; the spaces between the individual lamellæ are very broad. The deposition of calcareous salt is limited; still it is general and regular, as in the spongy substance. The external lamellæ are still distinctly cartilaginous, and frequently consist of clear cells with wall still thin; more internally are found quickly thick-walled cartilage cells; and after a very short course, we find already the above described form, in which the cells are no longer individually distinguishable, and the whole preparation looks like a section from a bone which has been macerated in hydrochloric acid. The cartilage, thus unchanged, is ossified then by the deposition of calcareous particles.

The softness of the cortical substance proceeds hence partly from its cartilaginous constitution, partly it is to be ascribed to the wide-meshed portion of bone, and in this respect it may be considered like the softness of healthy spongy osseous substance.

The influence of these changes in the process of ossification upon the configuration of the whole bone it is easy to perceive; and by the same facts the appearance of the rickety bone is easily explained.

The cartilaginous substance, which has become spongy by the formation of the medullary space, easily yields to the united pressure of the muscles, and the pressure of the heavy parts laid and pressing upon them. The first impulse alone is made to act on the arms; both impulses act together upon the legs; hence also the change in conformation must be more considerable upon the latter than upon the former. By means of the *momenta* or impulses specified, the bones in the neighbourhood of the joints are thrust up; and this mutual thrusting explains on its side the greater breadth of the parent cells and the intercellular substance found between them.

The broad meshed depositions of cortical substance determine the greater circumference of the bones in their middle portions; and if a solid canal is not yet formed before the commencement of the morbid process, the very loose constitution of the whole canal is then the cause that the middle portion of the bone yields to the action of the muscles and the pressure of weights, and is bent. For the reasons above assigned, this phenomenon must appear more strongly in the lower than in the upper extremities.

The phenomenon that bones that have been rickety are found, after the disease has been cured, thickened and hardened, finds its explanation in the state of the cortical substance in general,* in which the mesh spaces of the same are filled by the system of concentric tubes. When, therefore, the mesh spaces are particularly wide, and the deposition of cortical substance is peculiarly abundant, it is natural that, by this process of filling, a cortical substance is formed, which is peculiarly thick, and which yet, in proportion to its thickness, does not contain more canals, and is therefore substantially indurated.

Zurich, July 1849.

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* See the Memoir on the Cartilage and its Ossification, Meckel's Archiv. 1849, Heft iv. Seite 292.

ART. VIII.—*Some Account of a New Animal Substance occurring in the Urine of a Patient labouring under* MOLLITIES OSSIUM. By HENRY BENCE JONES, M.A., F.R.S., Physician to St George's Hospital. (Philosophical Transactions, 1848. Part I. Art. III. p. 55.) With *Observations on the Minute Anatomy of the Bones in that Disease, as revealed by the Microscope.* By JOHN DALRYMPLE, F.R.C.S. London. (Dublin Quarterly Journal, Vol. II. p. 85. 1846.) Abstract.

ON the 1st of November 1845, it was observed that a patient who had been for some time under the care of Dr Macintyre, was voiding urine which was at once of high specific gravity, and contained a large amount of matter, apparently coagulable by heat. The patient, a man of forty-seven years of age, had been for thirteen months in a state of infirm health. Dr Macintyre had observed the peculiar reaction of the urine on the 30th of October, and on the 1st November, when Dr Watson saw the patient along with him, the condition of the secretion was such, that two specimens of it were sent on the same day to Mr Henry Bence Jones for careful examination.

The urine was slightly acid. The specific gravity 1034·2. It contained a sediment consisting of crystalline phosphate of lime, oxalate of lime, and cylinders of fibrine. The urine became thick with heat from a deposit of the phosphates, but recovered its clearness on the addition of a drop of acid. It gave no precipitate with an excess of nitric acid, unless left to stand, or unless heated and left to cool, when it became solid. This solid was re-dissolved on the application of heat, and again formed on cooling. Continued boiling with strong nitric acid, evolved but little gas, and did not quickly hinder this reaction. Hydrochloric acid gave the same solid precipitate, soluble by heat. Strong acetic acid gave only a slight precipitate, which was re-dissolved by heat. Caustic potash, and sulphate of copper gave a bright blue clear liquid, passing when heated to claret colour.

In subsequent examinations, the same appearances nearly were observed; much phosphate of lime, sometimes amorphous, sometimes crystallized, was found in it; and the same cylinders of fibrine, generally coarse, were seen. On the 3d November the specific gravity was 1043·2, the highest rate observed in the entire course of the disease. On the 7th November it still coagulated firmly by heat, and very perfectly with a drop or two of acetic acid.

On the 9th of November, when the urine was loaded with urates, and had a specific gravity of 1037·2, it did not coagulate on the application of heat with the same readiness as on the two preceding days. It is stated that it bore brisk and prolonged boiling; that is, we understand, it did not coagulate.

The patient was passing about 35 ounces of urine daily.

On the 18th of November, when the urine was acid, the specific gravity was 1039·6; it contained much urate of ammonia, phosphate of lime, and oxalate of lime, and bore long-continued boiling without coagulating. At the same time it contained 109·28 grains per 1000 of solid matter. This solid residue appears to have varied considerably. On the 3d, when the density waz 1043·, it was about 126·3 per 1000; then 109; then 71; then 37·93 per 1000.

It was clear, that besides a considerable proportion of lime carried out of the system, with phosphoric acid and oxalic acid, an animal substance, probably new, was also eliminated.

A quantitative analysis, performed with care, furnished the following results:—

Water,......	890·72
New animal substance,...........	66·97
Urea,................................	29·90
Uric acid,...........................	·96
Earthy phosphate,.................	1·20
Chloride of sodium,...............	3·83
Sulphate of potash,......	2·10
Alkaline phosphate,...............	4·45
	1000·13

It is observed that, in the urine of 30th December 1845, whe the specific gravity was 1042·7, the highest observed except on there were no fibrinous cylinders.

The patient was now approaching near his end. He died, i deed, on the 2d of January 1846, sixty-three days after the ti when the urine was first subjected to careful chemical analysis.

The body was examined on the 3d of January. It was th found that the bony structure of the ribs was easily divided by t knife, and that the bodies of the vertebræ were capable of bei cut into slices.

The pericardium contained one ounce or two of fluid, whi gave a precepitate immediately by the addition of acid and t application of heat. The coagulum was not redissolved wh heated. The fluid was feebly alkaline; density 1015·7. He and acid coagulated the blood; and on heating the acid coagul it was not redissolved.

The kidneys were healthy to the naked eye and the microscop

The case was an instance of *Mollities Ossium*, not general, b partial. The softening had not extended to the cylindrical bones. This state of the bones was accordingly not recognised during life.

The detailed account of the condition of the bones, as elucidated by microscopical examination, shall be considered subsequently.

Meanwhile, it was ascertained, that a substance hitherto unknown, with much phosphate of lime, was carried out of the same through the urine.

The amount of the phosphates varied at different times. In the first analysis, when the density of the urine was 1043·2, the total phosphates were 5·68 per 1000; and in the next analysis, with density of 1039·6, they were 5·65. In the third and fourth analyses, with density respectively 1031·3 and 1037·9, the phosphates amounted to 8 per 1000 of urine. In the fifth analysis, when the specific gravity was 1042·7, the highest, except in the instance already mentioned of the 3d of November, the total phosphates amounted to 11·85 per 1000.

The facts indicated by these numbers show, that though the phosphates were greatly increased in amount towards the termination of life, yet their presence did not cause the high density. That appeared to be the result as much of the presence of urates as any other circumstance. It deserves notice also, that though the total phosphates steadily increased, yet there was not a proportional increase in the earthy phosphates, which were never so high as 2 per 1000, and which, in the four last analyses, gave respectively and successively the numbers, 1·20, 1·43, 1·57, 1·72 per 1000 parts of urine. The increase here is so trifling, if the calculation and analyses be accurate, being only ·52 per 1000, or a little above half of unity, that it seems impossible to apply it in any way in determining the presence or the extent of the disease. The great increase was in the alkaline phosphates.

It was important to ascertain the nature of the new substance. On this point Mr Jones communicates the following information.

The new substance was slowly but entirely dissolved in cold water.

It was much more readily dissolved by boiling water. If the boiling was continued, at first no appearance of coagulation was evident; but after ten minutes, in repeated experiments, a gelatinous coagulation took place. By continuing the boiling, adding small quantities of water from time to time, the coagulum was in the course of one hour entirely redissolved.

If water was poured on the substance in powder, it sometimes caked together; and on boiling it became horny, and resisted the action even of long-continued heat.

The substance was soluble in caustic potass, and after long standing, at the ordinary temperature, or at 140°. When the alkaline solution was neutralized by acetic acid, no precipitate was formed; but if an excess of acid was added, there fell an abundant precipitate, which was insoluble in more acetic acid, but was readily soluble by heat. If a great excess of acetic acid was added, this precipitate was redissolved.

The solution of this substance in water gave an immediate precipitate with nitric acid, which was entirely and readily dissolved when heated. Boiling caused no precipitation. On cooling, the precipitate again was formed. If the watery solution was acidulated with acetic acid, a white precipitate immediately fell on the addition of ferro-prussiate of potass. The precipitate was soluble in caustic potass.

The watery solution gave a precipitate with sulphate of copper and with bichloride of mercury. Each precipitate was readily redissolved when acetic acid was added. The precipitate with sulphate of copper was soluble in caustic potass, forming a fine deep blue solution, which, when heated, acquired a claret colour.

Strong hydrochloric acid dissolved the substance, forming a purple blue solution.

Dissolved in caustic potass and boiled, a deep inky black colour was produced by dropping acetate of lead into the solution.

The ultimate analysis showed that this substance, besides consisting of the four elements, carbon, hydrogen, nitrogen, and oxygen, contained also sulphur a little more than one per cent., and phosphorus only to a fractional amount, one-fifth of unit.

The presence of sulphur and phosphorus, according to Mr Jones, in this new substance, proves that it is not an oxyde of protein. The solubility of this body in water might lead to the comparison of it with the hydrated tritoxide of Proteine of Mulder, which is also soluble in water; but, according to Mulder, this hydrated tritoxide of protein gives no precipitate on the addition of ferro-prussiate of potass, and it contains no sulphur or phosphorus; while this new substance gives both sulphur and phosphorus, and also a precipitate with ferro-prussiate of potass. In these respects, therefore, the difference between the new substance and the hydrated tritoxide of protein is marked and essential.

The peculiar reaction of this new body with nitric acid, the solubility of the nitric acid precipitate when heated, Dr Jones finds to be also common to the so-called hydrated protoxide of protein, prepared from the inflammatory crust of the blood, from albumen of the blood by chlorine, and from albumen of egg. Lastly, this peculiar reaction with nitric acid precludes all possibility of confounding this new substance with albumen. Ordinary albumen, indeed, may be separated from this new substance by adding nitric acid, boiling and filtering while hot. On cooling, the hydrated oxide will be precipitated from the filtered liquid, and

it will again be redissolved by heat, while the albumen will remain on the filter.

The following conclusions regarding the chemical constitution and relations of this substance are given.

1. The ultimate analysis of this substance may be represented by carbon, 48; hydrogen, 38; nitrogen, 6; oxygen, 18; or by carbon, 40; hydrogen, 31; nitrogen, 5; oxygen, 15;—according as the formula for Protein is, carbon, 48; hydrogen, 37; nitrogen, 6; oxygen, 15; or carbon, 40; hydrogen, 30; nitrogen 5; oxygen, 12. Either will give, disregarding fractions, the following proportions:—

Carbon,	52
Hydrogen,	6
Nitrogen,	15
Oxygen,	26 or 25
	99

The fractions will complete the deficient unit. Hence Dr Jones infers that it is an oxide of albumen, and from the ultimate analysis that it is the hydrated oxide of albumen.

2. In this case of *Mollities Ossium*, 66·97 parts of this hydrated deutoxide of albumen were passing out of the system in every 1000 parts of urine. Hence, therefore, as much of this peculiar albuminous substance was contained in the urine as there is ordinary albumen in healthy blood. So far, then, as the albumen alone is concerned, each ounce of urine passed was equivalent to one ounce of blood lost.

3. The peculiar characteristic of this hydrated deutoxide of albumen was its solubility in boiling water, and the precipitate with nitric acid being dissolved by heat, and re-formed when cold. By this reaction a similar substance in small quantity may be detected in purulent matter and in the secretion from the *Vesiculæ Seminales.*

4. This substance should again be looked for in acute cases of *Mollities Ossium.* The reddening of the urine on the addition of nitric acid might probably lead to the rediscovery of it. When found, the presence of chlorine in the urine, of which a suspicion was entertained in the above mentioned case, should become a special subject of investigation, as it may lead not only to the explanation of the formation of this substance, but to the comprehension of the nature of the disease with which the bones are affected.

From the foregoing account, chemical readers will be enabled to form some idea of the nature of this substance thus accurately described by Mr Jones. While the accurate distinctions which he has made, cannot be estimated too highly, it may be observed, that all the experiments tend to show, that the substance was either some form of animal jelly, that is, gelatine, or nearly allied to that principle. This is so much the more probable, that the patient was actually labouring under a distemper in which the gelatinous matter of the bones was not in a healthy state. It is true that it has been believed that *mollities ossium* consists merely in the withdrawal or the absorption and eviction of the calcareous part of the bone. This view, however, is greatly too simple. The bone or bones are diseased in all their elements. Their assimilating or reparative powers are suspended or annihilated. It is not simply phosphate of lime, but bone or bony elements, that is, both gelatine and calcareous salts, that are carried out of the system; and thus it proved in the case now under consideration. We have now to direct attention to the state of the affected bones as ascertained by microscopical examination.

The disease appears to have commenced in the cancellated structure of the bone, for the external osseous laminæ are firmer and more healthy than in the internal. The smooth surface of the rib, however, is raised by internal growths elevating the outer laminæ here and there, into irregularly-sized and rounded dark red projections, visible through the periosteal covering. The outer layers are still hard, requiring the exertion of some force to cut them; they are thin, however, and when sliced, expose large cancellous cavities filled by a red gelatiniform substance, threaded here and there by fine bony fibres. It is in these fibres of still existing bone, that many of the more important morbid changes may be witnessed.

The gelatiniform substance is composed of—

1st, Granular matter.
2d, Oil globules.
3d, Fat cells.
4th, Nucleolated nuclear cells.
5th, Caudate cells.
6th, Blood cells.

Examined by a power of about 600 linear, we find that:

1st, The granular matter appears to be the disintegration of the tissues, or of the effete cells, mixed with an infinity of oil globules of great minuteness; partly also the granular matter which has escaped from bursten nucleated cells, since these latter are found to contain similar microscopic granules. It may be questionable whether any part of this granular matter be molecules of phosphatic earth.

2d, Oil globules are very numerous, of various sizes, from the 8000th of an inch in diameter, to the 300th, or even larger. They are easily recognised by their dark outlines and high refractive power, and seem to be floating free amongst the various nucleated cells. They are very frequent in the specimen of diseased vertebræ, but less numerous in the rib.

3d, Fat cells. Besides the oil-globules, many dark granular cells are observed, mostly of an oval form, and somewhat irregular as to size; they seem to consist of a fine transparent cell wall, the interior filled by round oil-globules closely aggregated, and thus giving them their dark appearance. In almost all respects, they resemble the adipose cells found in colostrum, and are well represented by fig. 21, in the fifth plate of Henle's *Anatomie Genérale* (French translation), specimen D, taken from the fluid of colostrum.

In some, whose shape is more irregular, the cell wall appears to have burst, and the globules are simply aggregated by a cohesive force, the globules disgregating on pressure, and constituting the free oil-globules found floating in the fluid.

4th, Nucleated cells appear to form the bulk of this gelatiniform mass, and appear in great numbers, of different sizes and forms, probably modifications only, or more or less advanced stages of the same matter. The greater number are round, some are oval, others more irregular, and pointed at one extremity. The round and smaller ones are about one and a half to twice larger than the average blood-cells, and, for the most part, contain a single and faint grey nucleus, with a very bright and distinct nucleolus.

The oval cells have frequently two included nuclei, each with a bright nucleolus.

The larger and more irregular cells often contain three nucleolated nuclei, but rarely more; once or twice I have seen indications of a fourth included nucleus. In all the cells, besides the nucleus, there is some very fine granular matter, appearing as fine black points.

5th, Caudate cells are very rare; but a few are recognised as feeble attempts at progressive development. There are, however, no perfect filamentous tissue cells to be seen.

6th, Blood cells, or blood disks, normal in every respect, are very numerous, extravasated amongst the other cells, and giving the red colour to the gelatiniform mass.

This account of the soft matter found in the cancellated cavities of the diseased bone, accords very nearly with the description given by Mr Birkett, in Mr Solly's paper on *Mollities Ossium*;* but the statements of Mr Rainey and Mr Simon differ so much from Mr Birkett's, and from each other, in their observations on the same specimen of disease, that we are left in some doubt as to the actual appearances.

Mr Rainey describes "a multitude of roundish bodies about the size of blood corpuscles, each of those bodies filled with a minutely granular substance" (*loco cit.*), he making no observation of nucleus or nucleolus. Again, he states, "Besides these bodies, it contained also fat globules, but no regular fat vesicles;" whilst Mr Simon "was unable to discover any new cell formation, or at any rate any mature one; cytoblasts were exceedingly plentiful, so as to suggest the probability, that some such process was in progress, but nothing further, with the exception of some two or three apparently detached young fat cells."

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* Medico-Chirurgical Transactions, Vol ix. New Series, p. 453.

These discrepancies may perhaps be accounted for on the supposition that these three gentlemen pursued their investigation on different portions of bone from distinct parts of the body, and in more or less advanced stages of the disease; for while Mr Birkett found a few caudate cells in the cranial bones, he discovered none in the vertebræ, and, in the femur, "nothing but fat cells and blood-disks."

Be this as it may, a very important part of the investigation remains untouched, viz., the condition of the still existing bone or previously healthy tissue. It will be interesting, therefore, to determine, if possible, the point where the hard parts of the bone first begin to suffer, by what means the original textures are removed, and the new matter made to occupy the place formerly filled by the healthy bone and its proper constituents.

It may at once be premised, that of the soft elements found in the diseased mass, the oil-globules, fat cells, and blood disks (within vessels), existed in the normal condition of the bone. The two former are those found in excess, and the latter are extravasated. The nucleated cells, of whatever kind, probably are new, and, therefore, morbid. These, together with granular matter, the debris of effete cells and broken down tissue, with a fluid menstruum, constitute the gelatiniform mass that occupies the large cells or enlarged cancelli of the bone; thence certain hard parts or bony fibres have disappeared, have become softened, dissolved, and carried away with their bone cells, proper canaliculi, and the former apparatus of growth and nutrition, Canals of Havers, lining membrane, and capillary vessels.

In order to estimate the process of this destruction, it is necessary to state, that, as regards the parts submitted to my observation, viz. the lumbar vertebræ and ribs, the quantity of tissue removed has not been replaced by an equal quantity of new or morbid matter, but that a real diminution has taken place, a veritable interstitial absorption. The lumbar vertebræ scarcely exceed in thickness the intervertebral substance, and have lost nearly one-third their normal bulk.

In the second place, besides the loss of bulk, there is a great deficiency of the cohesive properties of the bone, which can now be broken or cut with facility, in some places bent without fracture, in others rendered more brittle, and easily fractured.

This, it is evident, is due to the loss of the earthy constituents of the bone. This degeneration, however, is not uniform, but more immediately in the neighbourhood of cavities containing the gelatiniform substance; since even remains of cancellated bony fibres are found passing through these morbid masses, sometimes little altered, at others softened, but not destroyed, in a state of metamorphosis rather.

The external tables of the bone resist longer than other parts, and a whole bone may be so soft, *generally*, as to bear to be bent without breaking, although the external laminæ are still so hard as to be cut with difficulty, even with a strong knife.

The disease, therefore, probably, commences in the cancelli and medullary canals, and proceeds from the canals of Havers to the bone cells and canaliculi. It is to these latter points that attention must be directed.

If a minute fragment of bone be selected from the edge of one of these cavities, which contain the soft red matter, we shall often find edges thin enough for microscopic observation, without further interference than simply washing it clean from the nucleated cells and blood disks that surround and adhere to it. If it be then examined with a power of about 600 linear, certain changes of importance will become visible. The edges of the bone, at the very margin of the cavities alluded to, are reduced to the greatest possible tenuity, and appear to be embedded in a mass of nucleated cells, which adhere with great tenacity to the bone. When these are washed away, the bone itself seems composed of polyhedral cells, resembling some forms of vegetable tissue, but these cells are indistinctly visible, appear below the surface, and out of focus. When the eye is brought to look upon the superficies, the proper bone cells (bone corpuscles of some authors) become apparent. Instead, however, of the usual elongated, narrow oval cell, with more or less extended dendritic canaliculi radiating from their parietes, they are found considerably enlarged, or irregularly round, and the canaliculi proportionately shortened, in so much that the diminished length of the canaliculi seems to depend upon the enlargement of the cells whence they originate, or into which they pass.

At first sight the bone cells appear more numerous than is natural, but this is due to the approximation of the cells to each other, by reason of their mutual enlargement.

In those instances where the bone cells have undergone only early changes, although the enlargement and alteration of figure be still perceptible, the canaliculi are less disturbed, and in some aspects appear as if truncated, and crop out of the surface, resembling the tubular structure of ivory, when cut transversely to the direction of the tubes.

Away from the edges, or as we approach more solid portions of bone, presumably less implicated in the disease, the bone cells are found more of their natural size, more of their normal figure; the canaliculi longer and more arborescent,—in fact, less interfered with by diseased action.

It is difficult in such an investigation to say whether these enlarged bone cells are occupied or not by any of the nucleated cells; for, as the gelatiniform matter surrounds on all sides the portions of bone, and as it is composed of myriads of cells, blood cells, oil globules, and granular matter, it is obviously impossible to gain a view of the bone cells without a careful washing of the specimen in many waters.

The cellular *appearance* of the bone before spoken of, seems to be due to portions of the structure immediately surrounding the bone cells, being more transparent than elsewhere, as if indeed the denser part of the tissue immediately around a system of these bodies had been absorbed, and so enabled the transmitted light to shine through more easily. Although this is a point not very clearly determinable, especially as this appearance is more readily recognised when the instrument is not in its true focus, yet it favours the belief that absorption is set up in the immediate neighbourhood of the bone cells, and encourages the view that the enlargement of these cells is due to progressive absorption from their inner walls, and thus that their natural function of growth and support is in this instance perverted.

It is true, however, notwithstanding what has been assumed above, that we as yet want definite knowledge of the functions of the bone cells, and their canaliculi in the normal state; it is probable, however, that they are subservient to the purposes of growth and nutrition. In a transverse section of a long bone, they are found arranged with a good deal of regularity in the concentric osseous laminæ which surround each system of canals of Havers. These latter conduct the capillary plexus of blood-vessels; the plasma, or that fluid which contains the proper elements of nutrition, is eliminated, without doubt, from these blood-vessels. May not, then, the canaliculi, as a system of capillary tubes, convey the fluid to the bone cells, as organs of appropriation, and may not also effete parts, the displacement of old as well as the replacement of new, molecules, go on by these channels?

The observations made in the specimen of *mollities ossium* lend some colour to this view. In the neighbourhood of the diseased cavities from whence bone earth has already been removed, we find the bone cells all enlarged and altered in figure, interstitial absorption going on from surfaces, viz., from the inner walls of the bone cells themselves. Thus gradually enlarging, they at last run one into the other, and constitute the hollows now filled with the reproductive nucleated cells and the debris of old tissue.

While this destructive process goes on, we have evidence of undue turgescence of the vascular system. I am not aware whether any injection, or at least any *microscopically successful* injection, has ever been made of bone in this disease; but its greatly increased redness, even the extravasation of the so numerous blood disks, are proofs of the fact. Blood long effused undergoes many changes, microscopically considered; the cells become shrivelled, irregular, crenated, &c.; here, however, the disks are, for the most part, wholly normal.

Presuming, therefore, either a high degree of vascular congestion or of vascular activity to be present, the proper functions are perverted. Original structure is removed, soft as well as hard elements are carried out of the part by its own vascular system, and out of the body by the excretory glands, the still healthy kidneys. The particular case now under observation evidenced the most extraordinary morbid excretion, furnished by perfectly healthy excretory organs, the depuration of a vitiated blood. But while this waste or disintegration of the bone is going on, while the local circulation appears to be active, and the supply of blood increased, the lost parts are not replaced by new matter of a like kind; in place of a molecule of bone restored for one removed, we find cytoblasts, a nucleolated nuclear cell, each probably, as in malignant disease (with some special differences), capable of furnishing its like.

These facts admitted, were we to examine no further, *mollities ossium* would be reduced to the category of malignant diseases, a simple fungoid condition of the bone, to which, indeed, it bears some superficial resemblance.

In true malignant disease of bone, original structures are destroyed, and replaced by new and soft matters; but the mass ever increases, new cells go on producing still newer ones, until sometimes the tumour attains enormous bulk. In the true osteosarcoma, new bone is, however, formed, not much differing in its essential characters from healthy bone, while, in the disease under consideration, no new bone is ever formed, and the real bulk of parts is diminished.

It seems probable, therefore, that, in *mollities ossium*, the nucleated cells have a limited duration of life; some feeble attempts at progressive development are seen in the caudate cells, but after a certain reproductive process, the majority die, or become disintegrated, are resolved into granular matter and oil-globules, dissolve, and are carried out of the system by the circulation of the kidneys.

Such cells will therefore take a position a little above pus formations. Pus cells are nucleated, do not probably reproduce themselves, have a short time of existence, die, become disintegrated, fall into granular matter, oil, and *liquor puris*, and are, as we know, often absorbed. In mollities, the nucleated cells do probably reproduce their like; the original cell bursting, and giving out its nucleus, or nuclei; these latter pursue a similar course, then become disintegrated and fall to pieces. This explanation will account both for the very different shapes, sizes, and numbers of these cells and their included nuclei; while their shorter period of life, or ready disintegration, separates them from those higher forms of malignant disease, where the mass increases the more rapidly as it approaches its conclusion, or advances in a sort of arithmetical progression, until the patient is exhausted by the demand made upon the system for ever-increasing growth.

Already, attention has been directed to the fact, that, in the change of the bone substance now described, both the earthy and the animal matter was in a morbid state. The large cancellated cavities were filled with a red gelatiniform substance, traversed by fine bony fibres. This red gelatiniform substance, there is reason to believe, was one of the effects of the morbid action; and its constitution, as described by Mr Dalrymple, pp. 362–364, shows that it could have been produced only by a morbid process. On the nature of this morbid process, little more than conjecture can be formed. That there was a process of disintegration, or retrograde nutrition, as it is occasionally called, is manifest from the results of chemical analysis. According to Mr Jones, every ounce of urine discharged was equivalent to one ounce of blood carried out of the system. This may be over-rated; but if it be not, thirty-five ounces of blood were carried out of the system daily. But even supposing that the amount lost to the system daily was only twenty ounces of blood, it shows that a destructive process of disintegration was going on most rapidly in the bones.

The change in shape in the bone cells or corpuscles from oblong and narrow to broad and short, or almost round, though it indicates the great alteration in the bone, is probably a secondary effect only, that is, a change in figure, in consequence of change in constituent parts. This change in figure may be held to indicate that the bone cells were softened, and had yielded to pressure.

PART II.

CRITICAL ANALYSIS.

ART. I.—1. *Outlines of Structural and Physiological Botany.* By ARTHUR HENFREY, F.L.S., &c., Lecturer on Botany at St George's Hospital, and the Middlesex Hospital, &c. With Numerous Illustrations. London, 1847. 12mo. Pp. 245, and pp. xlvii.

2. *Principles of Scientific Botany; or, Botany as an Inductive Science.* By Dr J. M. SCHLEIDEN, Extraordinary Professor of Botany in the University of Jena. Translated by EDWIN LANKESTER, M.D., F.R.S., F.L.S., &c., Lecturer on Materia Medica and Botany at the St George's School of Medicine, London. London, 1849. Pp. 616.

"BOTANY," says Dr Schleiden, "as an inductive science, comprehends the study of the laws and forms of the vegetable kingdom. As an experimental science, he adds, it takes a very low position, and at present embraces but a very narrow circle of actually established facts, few indications of natural laws, and no fundamental principles or ideas by which it might be developed."

This cannot be called a definition, or even such a description that the student can understand what he is to do, what he is to observe, and what he is to learn. To us it appears that Botany may be defined as that branch of natural science which has for its object the elucidation of the structure, and the explanation of the properties and functions, of Vegetable Bodies, with the investigation into the nature of those laws by which their living actions are regulated. In this sense it embraces the following divisions; —1st, The anatomy of plants, or the history of the different forms of structure observed in vegetable bodies; 2d, The study of the chemical constituents of plants, the chemical actions of which they are the seat, and the chemical phenomena to which they give rise; and, 3d, The study of the processes which take place in plants as living bodies. It is of no moment whether these processes are to be regarded as physical, as some maintain, or as vital, that is, peculiar to living bodies, as others think. It is enough that these processes take place in plants as living bodie that they are more or less modified by the influence of peculi laws, and that they take place in living plants, not in those whic are dead. The processes to which we refer are those which correspond to the introduction and digestion of food in animals, circulation, respiration, absorption, secretion, and excretion ; i short, to all those processes of which the object and end are th growth of the individual and the propagation of the species The whole of these several objects will readily place themselves under one division or another of botanical science.

In every science, it is perhaps a truism, yet it is of the utmost importance to bear in mind, that all explanations, all didactic information, ought to have reference to the mental faculties. Dr Schleiden thinks, that, with regard to botany, the arrangement of the materials of instruction may be most conveniently divided in the following manner.

1. Vegetable Chemistry; 2. The Study of the Plant-cell; 3. MORPHOLOGY, or the Study of the Forms of Plants and their Organs; and, 4. ORGANOLOGY, or the Study of the Life of the Entire Plant and its Organs. It is almost superfluous to remark, that, under the head of Morphology, comes the Anatomy of Plants, or the History of their Structure; and under that of Organology, according to the present division, is placed Vegetable Physiology, or the history of those living processes by which the existence of the plant is maintained and its growth promoted, and by which plants propagate other similar plants.

The arrangement adopted by Mr Henfrey is so similar, that it may be considered as essentially the same. He treats, first, of the Chemical Composition of Vegetables (Chapter I.); next, under the head of Elementary Structure, of the Cell as an individual, and cells conjoined, so as to form tissues and organs (Chapter II.); then of the Properties and Actions of these Elementary Structures (Chapter III.); then of the Individual Plant, and of its Constituent Parts (Chapters IV., V., and VI.); then of the Physiology of Vegetable Bodies (Chapter VII.); then of the Reproductive Process and its Agents (Chapters VIII. and IX.); and, lastly, of the General Physiology of Plants.

The chemical elements in vegetable bodies are of two orders; the inorganic and the organic. The inorganic are those which were formerly called ultimate principles, because their existence was shown only by ultimate analysis and destructive decomposition. These are, carbon, hydrogen, oxygen, and nitrogen, in the first place; and, in smaller proportion, and less generally distributed, chlorine, iodine, bromine, sulphur, phosphorus, silicon or silica, potassium, sodium, calcium, magnesium, aluminum, iron, manganese, copper. Of these, carbon is the most abundant, and carbon, hydrogen, and oxygen exist in all plants; while nitrogen is found only in certain orders, especially the fungi, the seeds of several of the Cerealia, the leaves of Tea, and the berries of Coffee.

Of the origin of these elements in plants, only one opinion is at present entertained, namely, that they are taken up from without, although some speculators, influenced probably by the love of the marvellous and the mysterious, maintained that they were in some mode formed by the organs of the plant. All these substances are either conveyed into the plant through the medium of the water surrounding it, or through that of the air.

The inorganic elements, combined in various modes and proportions, form the organic elements or proximate principles, as they used to be denominated. These are, 1. cellulose, or sklerogen; 2. amyloid; 3. vegetable jelly, or pectine; 4. starch; 5. gum; 6. sugar; 7. inulin; and 8. oil and wax.

1. Cellulose, sklerogen, or lignine, is the woody matter found in and produced by many vegetable substances. It is principally characterised by this circumstance, that, when treated with caustic potass, or concentrated sulphuric acid, starch is formed. It is abundant in the husks of seeds, the coverings of nuts, and various similar parts of plants.

3. Of vegetable jelly, bassorin, the most obvious example is salep, and, it may be added, the Irish moss or Carageen (*Chondrus crispus*). When dry, it is horny or cartilaginous; but when moist, it swells and assumes the appearance of jelly, more or less tremulous. It is insoluble in fixed and volatile oils, ether, and alkohol, and is not coloured by iodine. It passes, on the one side, through various transitionary states into Cellulose, through the cell walls of the FUCOIDEÆ, and into amyloid; and, on the other, into starch, and in many modes into gum and sugar.

In the same manner as in animal chemistry, a distinction is made between gelatine and gelatinous substances; so Kutzing distinguishes between vegetable jelly and Gelin, the former of which, by boiling, passes into the latter. Vegetable jelly also, by long boiling, passes into *Protoplasma* or gluten. These three principles Dr Schleiden regards as hydrated states of one common fundamental principle. He thinks it doubtful whether pectin and pectic acid ought to be placed under the head of Jelly.

4. *Starch. Amylum.*—The characters of this substance are well known. Varieties are lichen starch, potato starch, wheat or cereal starch, arrow root, sago, and many others.

Starch is the most generally distributed principle in the vegetable kingdom; for there is scarcely a vegetable production in which starch does not form a portion more or less considerable in its growing and grown life; and in a great number of vegetable bodies it is most abundant. This extensive and copious distribution of starch is evidently connected with the uses of the vegetable world as means for furnishing food to man and animals. Many vegetable substances,—both roots, tubers, stems, and seeds,—owe their power of furnishing food to the quantity of starch which they contain, and may be made to supply. Dr Schleiden thinks it is no exaggeration to assert, that starch constitutes the most important and the almost exclusive food of two-thirds of the whole human race. Certain parts of plants contain it in the largest quantity, namely, the albumen of the seeds of the Cerealia, the cotyledons of the LEGUMINOSÆ, the medulla or pith of the stem in the CYCADEÆ and Palms, the bulbs of the LILIACEÆ, the tubers, root-stocks, and roots of different families of plants.

Though starch has been the subject of many researches by different inquirers, yet on few subjects are there prevalent so many opposite and conflicting opinions. It was the opinion of Poggendorf in 1836, that after ten years of investigations we are little or nothing in advance of the old views; and at present Dr Schleiden entertains nearly the same idea.

5. *Gum* (Arabin, Dextrin, Vegetable Mucilage in part).—Its appearance and characters are well known. It is found in a state of solution in the interior of cells, or as a secretion in the large gum canals, and not unfrequently mixed with vegetable jelly, and is frequently, by means of foreign substances, coloured yellow or brown. The purest is Gum Arabic. It is found in large quantity in the MIMOSÆ and CYCADEÆ.

Dextrin, which can be formed by the action of dilute sulphuric acid, diastase, &c. in cellulose or starch, agrees in many points with gum, and especially in elementary composition. According to Mulder, the greater part of what has hitherto been called gum is dextrin. Some time back, namely, in 1843, Dr Schleiden advanced the opinion, that dextrin must be present in plants where so much cellulose and starch was dissolved and changed. Soon after, Mitscherlich pointed out the actual presence of dextrin in the sap of many plants. The principal difference between gum and dextrin consists in the fact, that the latter, by the action of dilute sulphuric acid or diastase, is converted into grape sugar, while the first is not. Gum, the author thinks, originates in the plant from dextrin, and is not formed as a special product of secretion; whilst dextrin is present in all the juices of the plant, and especially where cells are about to be formed, and it appears to be the formative matter of the plant. The modifications of dextrin through vegetable jelly, till it forms cellulose, are almost innumerable. The transition relations of dextrin may be thus stated;—dextrin, gum, vegetable jelly, cellulose.

6. *Sugar.*—This well known substance is most widely distri-

buted through the vegetable kingdom, and especially where starch and the other substances are in the process of development, or are being dissolved; as in unripe peas, and the cereal grains; and the early sap of trees, as of the maple and beech. It is found in greater quantity and in a more permanent form in the stems of grasses, as the sugar-cane and maize, and the *Holcus saccharatus;* in fleshy roots, as the carrot, parsnip, and beet; and in juicy fruits, as the pear and apple, gooseberry and currant. Naturally it is found dissolved in the plant; but when it is excreted, it assumes the form of crystals, as in the nectaries of plants, for instance, *fritillaria imperialis.* Mannite, the sugar of manna, he regards as not belonging to this series of substances.

7. Inulin,—of which varieties are Dahlin, Calendulin, Synantherin, Sinistrin,—is obtained from the tubes of the Dahlia by simple washing. It is a powder, with fine grains; the grains clear, easily soluble in boiling water, from which it separates, on cooling, in a granular form. From the atomic proportions given by the analyses of Mulder and Crookewitt (C^{12}, H^{10}, O^{10}) as to Inulin from the Dahlia, Helenium, and the Dandelion, it must be isomeric with sugar and starch. Inulin is found in many parts of the vegetable kingdom, where formerly starch was supposed to be contained, as in tubers and fleshy roots; for instance, *Inula Helenium, Dahlia variabilis;* and Dr Schleiden thinks it probable that it is widely distributed.

8. *Fixed Oils and Wax.*—Of the latter substance, not much is accurately known. It is evidently very extensively diffused. In all those plants and parts of plants called hoary, and covered with down, the delicate bluish bloom consists of a thin layer of very minute wax granules. One of the best examples is the bloom or the down of the peach. Wax, he adds decidedly, is formed by bees out of sugar. Is it not collected by the bees from the parts of flowers?

9. A class of substances is found in plants which neither exist in the cell walls, nor are the cell walls formed from them; yet their presence is necessary for the simplest processes of vegetation. Besides the three usual principles of carbon, hydrogen, and oxygen, nitrogen is added, and sometimes phosphorus and sulphur. To these substances, which the chemists distinguish by the several names of albumen, gluten, gliadin, zymom, gelatin, diastase, vegetable gluten, legumin, &c. Dr Schleiden applies the general denomination of Mucus (SCHLEIM). Hugo Von Mohl has named it PROTOPLASMA, from its resemblance to albumen. Some of the varieties now named, Dr Schleiden thinks, may be the result of some process of separation from the plant. According to chemical properties they have been distinguished into three groups;—vegetable albumen; fibrin, the gluten of the CEREALIA; and

Casein, which is the legumin of beans, peas, and other seeds of the LEGUMINOSÆ. To these, Dumas adds a fourth, namely, Animal Gelatin, which, however, Schleiden thinks should be regarded as part of the composition of gluten. Mulder shows that all these substances have one common basis, which, in the same manner as in animal chemistry, he denominates PROTEINE; and he infers, that proteine, combined with sulphur, forms casein; with phosphorus and sulphur, fibrin; and with a larger proportion of sulphur, albumen. Mulder further observes, that these substances cannot be formed in the animal body, but must be introduced from without.

The principles or substances now enumerated are, during the life of the plant, incessantly passing from one to the other; and for this object the presence of mucus or albumen in the cells appears to be necessary. All are carried, suspended, or dissolved in the juices of the plant; and though some of them may co-exist at the same time in these juices, yet several of them appear to succeed each other in regular and uninterrupted series. The substance which to-day is amyloid, dextrin, and vegetable jelly, may, in the course of a few days, be sugar, starch, or gum. Dr Schleiden thinks that it is impossible to regard them as well-defined or distinct forms of matter, since they are thus mutually interchangeable. It is possible, also, he observes, to produce this series of bodies by mixing them with mucus, that is, vegetable albumen, or acting upon them with sulphuric acid or alkalies, or even by repeated solutions or evaporations. But this mode of expressing himself is not accurate; and what he means, we conceive, is, that any one of these bodies may be converted into the other by the use of sulphuric acid and the alkalies, or by such chemical processes as repeated solutions and evaporations. To the property which albumen, sulphuric acid, and similar agents thus possess of producing in other bodies chemical changes without themselves becoming changed, Berzelius gave the name of CATALYSIS, and Mitscherlich, that of CONTACT-ACTION.

It has been supposed that these peculiar changes depend on the operation of that principle which has been assumed to pervade living bodies, namely, the Vital. This, Dr Schleiden is not very willing to admit, and he speaks of it as a principle or property, the existence and agency of which requires yet to be proved. On this point we need say nothing at present, after what has been formerly said in volume seventy-second, p. 386.

All that can be said in reference to the present subject is, that we know with certainty that, without the plant, cellulose passes into starch, that starch passes into dextrin, dextrin and cane-sugar into grape sugar, and grape sugar into gum, as in the fermentation of beet-root juice. We further know, that while the first process, that of the transition of cellulose into starch, is effected only through the agency of sulphuric acid, all the other metamorphoses can be produced without the plant, by the agency of nitrogenous substances, as albumen. It may therefore be concluded, with a considerable amount of probability, that within the bodies of plants sugar passes into dextrin, dextrin into starch, amyloid, cellulose, and vegetable jelly, that a transition takes place from wax into sugar, from sugar and starch into wax, from starch into fixed oils, and from the fixed oils into sugar and dextrin. All these changes depend chiefly on the reception or the deposition of oxygen.

Other principles present in plants, and which appear to stand in close relation with the process of vegetation, are, 1. Chlorophyll and other colouring matters; 2. Malic, citric, and tartaric acids; 3. Alkaloid substances; 4. Tannin; 5. Viscin, caoutchouc, and Gutta Percha; and 6. Humus. On these it is unnecessary further to dwell.

We shall merely remind the reader that Humin and Ulmin, the two forms of vegetable mould, furnish five acids; the humic, ulmic, geinic, crenic, and apocrenic acids. These various substances must be regarded as the result of the slow spontaneous decomposition of vegetable and animal matters; for it is impossible in this process to distinguish these two orders of substances. The bodies of insects, worms, reptiles, birds, and portions of the mammalia are all mixed with the leaves, stems, seeds, fruits, and other parts of vegetables, and acted on by moisture and heat, are constantly producing the substance called HUMUS or mould. The mixture of this substance with fragments of the rocks which form the surface of the earth, constitute the arable land or workable soil, which is the natural and most suitable medium of growth for the larger proportion of plants. The chief point of view under which Humin deserves notice in this place is, that being itself a product in a great measure of vegetable decomposition, and then being employed to minister supplies of various substances to the new plants, some knowledge of its characters is necessary in forming correct views of the chemical constitution of plants, and the chemical processes going on in them.

Besides the general principles now mentioned, and which are more or less common to all vegetable bodies, there is a large list of substances, acid,, alkaloid, resinous, oily, or otherwise, which are found in different orders of plants, and more or less confined to these. Such are the various vegetable alkaloids and acids, cinchona and cinchonic acid, morphia, and meconic acid, narcotin, conia, bitter principles of various kinds, and similar agents, some of them exerting very powerful influence, not unfrequently deleterious, upon animal life. These are so numerous, that to name them even would occupy several pages.

The Plant Cell forms the second subject of consideration to the scientific botanist.

To those conversant with the history of botanical research and the scientific study of the structure of plants, it is well known that Robert Hooke, the earliest of English micrographers, was the first discoverer of the cellular structure of plants. He began his researches in 1619, when he received a microscope, brought to England by Cornelius Drebbel; and he appears to have beheld the cellular arrangement in 1620. After him came Marcello Malpighi, professor of anatomy at Bologna. He not only observed the celluliform structure of plants, but represented it to be composed of separate cells, to which he applied the name of *Utriculi.* Nehemiah Grew, who, during the time of Malpighi, was secretary to the Royal Society, was aware of the cellular formation; but he makes some mistakes as to the structure of their walls, which more careful observation would have enabled him to avoid.

It is singular, that though glimpses of the celluliform structure were thus early obtained, yet for a long period, nearly two centuries, it may be said, no step was taken to study the structure fully and systematically. It was only in 1833 that Robert Brown, in an interesting memoir on the ORCHIDEÆ, made known the existence of the cytoblast or cell-nucleus as a body frequently present in plants. He gave it the name of Nucleus of the Cell. In 1835 Hugo Von Mohl made known the multiplication of the vegetable cell by division in the instance of the Stomata in the Linnæa; but this contained several imperfections, which were rectified by subsequent observation.

In 1838 Schleiden first described accurately the vegetable cell, and first pronounced its formation to be the fundamental principle in botany. By plant cell, he tells the reader, he understands exclusively the elementary organ, which, when fully developed, possesses a wall formed of cellulose and a semifluid nitrogenous content, as constituting the essential element of form in all plants, and without which the object is not a plant. These cells, for they are always multiplied, can only be formed in a fluid which contains sugar, dextrine, and albumen, (protoplasma or proteine compounds), in short, a nitrogenous element. The proteine compounds, he thinks, are the primary agents in the process as in the chemical transformations. He specifies two circumstances as requiring to be distinguished.

The *first* is the formation of cells without the influence of another cell previously existing, as is exemplified in fluids capable of fermentation. A globule of nitrogenous substance first arises; in this a cavity is formed; it grows; and the complete cell has a delicate coat of cellulose or lignin, without our being able to determine the period at which it is produced.

The *second* circumstance is the formation of cells under the influence of a complete cell already existing, or the multiplication of the plant-cell. The mode of multiplication of vegetable cells appears not to follow the same type in all cases. He distinguishes two sorts of multiplication.

First, the *Protoplasma* or nitrogenous substance is collected into a more or less perfectly spherical body, which is at length sharply defined, and forms the nucleus of the cell, or cytoblast. Upon this is deposited a layer of protoplasm or albumen, which expands as a vesicle, and forms the subsequent lining of the cell. At a very early period the whole becomes enclosed by a wall of cellulose, and the cell is completed. This mode of multiplication appears to take place especially in the embryo sac and the embryal vesicle.

In the second mode, the whole contents of a cell, including the nitrogenous lining, are divided into two portions, which appear to be separated by a lighter zone; and around each portion is formed a wall of cellulose. The nucleus may, in this case, either be divided so as to form two *nuclei*, each of which becomes the central point for one of the cell-forming portions of the content; or it may disappear, while a new nucleus is developed in each of the new cells after their production. This second mode of multiplication appears to occur in all the other parts of the plant.

The cytoblast is met with in all newly formed cellular tissues; but at a later period it disappears from the same cells. It is seen in various stages of progress to perfection. When perfectly formed, it is a flat, lenticular, sharply defined, transparent, pale-yellow body, in which it is easy to distinguish one or two, seldom three, sharply defined and evidently hollow corpuscles, which are called *Nucleoli.* In its most imperfect form, it appears merely as a flat, yellow, semigranular globule, in which are no *nucleoli,* and in which nucleoli do not subsequently appear. It varies in characters according to the plant, as well as its age; in colour, from perfect clearness to a dark yellow grey; in consistence, from granular albumen to a firm homogeneous mass; in the number of its nucleoli, from one to three; in the form of the *nucleoli,* from total absence to a hollow globule; and in its own shape, which may be globular, lenticular, or egg-shaped; and in the degree of attachment to the cell wall, from loose adhesion to perfect union with the cell wall and enclosure in a duplicature of the same.

"When the cytoblasts are perfectly formed, they soon present a delicate membrane, which encloses them, and which is sometimes extremely fine and soft, and sometimes thicker and more compact. This membrane soon becomes elevated on one surface of the cytoblast in a vesicular form, and gradually extends itself, so that the cytoblast occupies at last a small part of the wall; but still the cytoblast continues to enlarge, and the nucleoli become more evidently defined. The membrane of the vesicle, or young cell, becomes gradually stronger and thicker; it gets a round, or sometimes an elongated, form, and sometimes an irregular edge, which subsequently disappears."—P. 33.

Another mode of cell formation has been pointed out by Naegeli, who observed it first in the primitive cells of the pollen, and subsequently found it in a large number of Algæ. This Dr Schleiden has not himself hitherto seen; but he gives the following statement from the description of Naegeli.

" So long as a cell is internally covered with a layer of mucus, this process may go on. In the first place, this mucus layer is divided into two or four parts, each of which is surrounded by a delicate layer of mucus. These external mucus layers are converted into cellulose, and thus two or four little sacs or cells are formed, which perfectly fill up the primitive cell. In a peculiar and hitherto unexplained way, the cytoblast seems to be very active in this process. This increase takes place in most instances in cells with a central cytoblast, and this divides itself into two or four cytoblasts, each of which becomes the central point of a new cell."—P. 34.

No objection, Dr Schleiden thinks, can be made to this history of cell-formation, founded on observations so careful.

To this theory, nevertheless, Mr Henfrey urges the objection, that there is no explanation of the mode in which the albuminous sac or primordial utricle becomes divided; and the evidence of the simultaneous deposition of the septa is insufficient. This, he adds, will become apparent in the consideration of the next theory.

He then states, as a third mode of formation of new cells, that it commences by the doubling inward of the primordial utricle, so as to form an annular or ring-shaped channel. This gradually increases in depth till it divides the utricle into two portions, each a perfect closed sac. The unfolding of the primordial utricle is followed by a deposition of permanent cell-wall from each lamella.

What is the use of the nucleus, what function does it perform? is a natural question. This point, nevertheless, has not been determined. Mr Henfrey thinks with Mohl, that it is intimately connected with the chemico-organic changes of the cell-content, and that it is concerned in the elaboration of the mucilaginous or rather plastic granular matter, which is named by Mohl, *Protoplasma*.

Our limits permit not to give all the facts adduced by the authors on the process of cell-formation and the different modifications which it undergoes. But we subjoin as general inferences the following remarks.

" Up to the present time no fact has occurred which is not in accordance with the complete precedence of the cytoblast, as above observed. The indications of its precedence are only obscure and incomplete in those cases in which accurate observation is surrounded by insurmountable obstacles. It is in the formation of the spores, the foundation of the future plant, in *Cryptogamia ;* in the embryo, the young plant itself, of the *Phanerogamia*, that the precedence of the cytoblast is fully made out. Both serve as points of support for analogous conclusions in other cases ; and it appears, until further researches may necessitate modification, that we may safely conclude that the precedence of the cytoblast in the formation of cells is a universal fact.

"If, further, we regard the easy transformation of the assimilated matters, and may from artificially conducted experiments draw the conclusion that the nitrogenous matter which I have called mucus, and which forms the cytoblast, is the substance which calls forth these transformations ; and if we further remark that sugar and dextrin are more easily soluble than jelly, and that sugar and gum are changed into jelly if the quantity of water is not increased, and which must be necessarily precipitated, we must regard the whole process of cell-formation as simply a chemical act. The gathering together of granules of mucus to form the cytoblast we can as little explain as that, when we form a solution of two salts, if we throw into the mixture a crystal of one or the other salt, that salt alone crystallizes around it."—P. 35.

It is well known that this celluliform structure, which is thus shown to form the basis of the vegetable tissues, Schwann has shown, is extended to animal bodies. On this extension Dr Schleiden delivers the following commentary :

"Schwann has pointed out, in an acute and profound treatise, that the animal organism also is composed of cells, and that these cells are formed in the same way as those of plants. If this law is found essential to some plants and animals, this analogy forms a basis for enunciating this mode of formation as a universal law for both kingdoms of nature.

"In the same work Schwann has given an interesting comparison between the formation of crystals and cells, and he was led to this from a consideration of the nature of the substances of which the last are formed. This view in future may be of the greatest importance, as it shows that the apparent gulph between the organic and inorganic kingdoms may not be impassable. There is one point to which I would allude, and which seems to have escaped the attention of Schwann. In the formation of the crystal, the matter of the same already exists, as such, dissolved in the fluid, and only awaits the withdrawal of the solvent to assume its peculiar form : it is otherwise in the cell of the plant. Here the organic substance forming the substance of the cell is not present in the cytoblast, but is formed through another necessarily present substance, and this only takes place when the new-formed substance is relatively insoluble.

"In the crystallization of salts, such as the nitrate of potassa, from a solution, we can observe the increase of the crystal from additions to it from without. But, on the other hand, if we take a solution of two substances which form, when mixed, a precipitate, we shall find, on examining this under the microscope, that a membrane divides the two fluids. Accurate observation will show that this membrane consists of crystals of various sizes. If the fluid remains quiet, some of the crystals are projected into it on both sides; if the fluids are mixed, the crystals are dissolved up again. After many careful observations, I believe that all inorganic substances, if they are allowed to remain quiet, assume a crystalline form; and that the so-called pulverulent precipitates consist of crystals, the form of which, from their smallness, cannot be observed.

"In the last place, I must mention a highly interesting analogy, which, when more acurately examined, may perhaps one day lead to the most satisfactory explanation of the process of cell-formation, —I mean vinous fermentation. We have here a fluid in which sugar and dextrin, and a nitrogenous matter, as a cytoblast, are present. At a certain temperature, which is perhaps necessary to the chemical activity of the mucus, there originates, without, as it appears, the influence of a living plant, a process of cell-formation (the origin of the so-called fermentation fungus), and it appears that it is only the vegetation of these cells which produces the peculiar changes that occur in the fluid. Whether this organism is really a fungus, is a matter of indifference; but whether it alone, through the activity of its vital processes, determines the process of fermentation, deserves to be accurately determined.

"I will here add my own observations on these fermentation-cells. I bruised some currants with sugar, and, having pressed the juice through a cloth, diluted it with water, and filtered through folded paper. The fluid was bright red, quite clear and transparent, and, under the microscope, showed no trace of granules, but presented a number of little drops of a pure clear oil. At the end of twenty-four hours the whole fluid was opalescent, and presented, under the microscope, a number of granules suspended in it. On the second day these granules had greatly increased, and there appeared amongst them perfectly-formed ferment-cells. There also appeared, now and then, vesicles of carbonic acid gas. On the fourth day fermentation was very active. At the bottom of the vessel, and on the surface of the fluid, yeast had formed; but these yeasts consisted of single cells, or several attached one to another. In the solitary cells could be observed the way in which one cell was formed from another. The ferment-cells do not in this state permit of a distinction between the contents and the membrane of the cell. In the midst of the cell there is a transparent spot; but whether hollow, or a solid nucleus, I could not decide. The remaining parts appeared entirely homogeneous, yellowish like a nitrogenous substance, sometimes mixed with small solitary granules. In a similar way, a solution of sugar with elder-flowers was examined, and gave similar results. Other results were obtained in the following way. Pure white protein (albumen), from the white of an egg, was dried, and rubbed down with sugar, and left to ferment; the fluid at first was perfectly clear. On the third day the small portions of protein, which at the commencement exhibited a sharply angular aspect, assumed partly a granular aspect, and some a more or less rounded form. These globules showed an active molecular movement, and some appeared strung together. On the fourth day there was seen between these granules round or elongated cells, which were either solitary or arranged together in a line with a tendency to the formation of branched fibres. These cells were not more than one-third of the diameter of ordinary ferment-cells. An active fermentation went on, and gas-bubbles were given out from the protein-granules and the linear-cells. Proper ferment cells did not make their appearance. Fluid albumen, mixed with sugar and filtered, became thickened on the second day, and contained little granules of albumen (coagulated ?). The further phenomena were similar to those exhibited by the preceding, except that there were developed a few true ferment-cells. Protein moistened with water displayed the same appearances as when mixed with sugar and water: ultimately putrefaction came on, and the development of infusoria, but the vegetable formation preceded. There appear to be two very different types of ferment-cells, according as the fluid contains organic acids and essential oils or not. From the phenomena exhibited by the ferment-cells, one might be inclined to regard them as similar to animal-cells, which are formed through a cavity in the cytoblast, and which afford indications of the nucleoli in their highest development. But this analogy is not tenable, and the above observations must be regarded as imperfect. If we take fully developed ferment-cells, and treat them with ether, alcohol, or caustic alkalies, there will be found in the fluid a number of globular delicate cells, with thin but clearly distinguishable walls, which contain a clear fluid, with here and there very small granules, which, alone or in groups, are attached to the inner surface of the cell wall, and (almost ?) always a large round flat body (a cytoblast ?)"—Pp. 35–37.

The typical and normal form of a cell is a sphere. This, however, is only the case when they are free from pressure, or when nutrition proceeds equally in the whole membrane. It is manifest, however, that, as an infinite number of cells co-exist, and as one cell is divided and multiplied into many, their figure must be altered for the effect of morbid pressure. They are thus converted into dodecahedrons.

The combination of cells forms the different tissues of which plants consist; for instance, parenchyma of various sorts, the intercellular system; the intercellular substance; vessels; vascular bundles; the tissue of the liber; milk vessels; epidermal tissue; appendicular organs; cork; and the root membrane.

The only point which we can spare room to notice is the existence of what are called *Stomata,* literally, mouths or orifices, and of which we shall endeavour to communicate some idea from the treatise by Mr Henfrey.

In speaking of the epidermis, which generally consists of flattened tubular cells, thickened at their upper surface and sides, he states that this outer hardened part has been by some regarded as cuticle, and accounted an independent structure. The fact of its production by the walls of the epidermal cells, he regards as proved; but it is still undetermined whether it be a secretion of extra-cellular substance on the outside of the cells, or whether the cuticle is nothing more than the internally deposited secondary layers of the epidermis cells. The point is one of difficulty. But Mr Henfrey thinks that he has succeeded, as Mohl had previously done, in tracing the primary wall through the thickened cuticle to the surface in some instances. In stripping off the cuticle, the epidermal cells are often deprived of their upper wall. If the cuticle were secreted by the outside of the primary wall, the adhesion would be slight at the point of formation, and the extra-cellular substance would, he argues, be separated from the cell wall, as it would be much weaker, from its more recent production. When the secondary layers of epidermal cells are formed,—and they are often produced to considerable thickness,—the evaporation of fluids and gases from the subjacent tissue is prevented. To allow of this, and at the same time to regulate it, what are called STOMATA are formed. These are passages between the cells of the epidermis, bordered by cells of a peculiar form; they are generally two, of a semilunar shape, their convexities directed outwards; by contraction, the semilunar form becomes crescentic, thus leaving an oval slit between them; and the degree to which they open is regulated by the hygroscopic state of the tissue.

These stomata vary considerably in appearance and position in different plants. Sometimes they are on a level with the epidermal cells, very frequently at the point of junction of the epidermal cells with the parenchyma below; and, in the proteaceæ, they are formed of three or more cells. They are usually at the surface, and open to the intercellular passages of the parenchyma; but in some instances they are situate on the walls of a cavity, which contracts to a small orifice on the surface of the epidermis. In this case, the regulating semilunar cells may be wholly wanting.

The stomata are most abundant on the under surface of leaves, frequently wholly wanting on the upper, especially in those possessed of a dense shining cuticle. The development of stomata has been examined by Mohl in *Hyacinthus Orientalis*. In the lower part of young leaves, between the epidermis cells, smaller cells may be perceived with their transverse diameter greater than their longitudinal one. A septum is formed longitudinally ac-

cording to the usual process of cell-multiplication; and these two layers subsequently separate from each other, leaving the slit or orifice of the stomata open.

It has lately been ascertained that the cuticle penetrates the stomata of many plants, and in some even sends prolongations into the inter-cellular passages between the epidermis cells and those of the parenchyma; but it is observed that it is wanting at the points of contact between the cells.

The Termination of Cell-Life is an era of some importance to the physiological observer. Of this the following passages from Schleiden may serve to give some idea.

"As soon as the play of chemical affinities has become impossible in a cell, the latter must be regarded as individually dead. So far, all cells must be considered to have died as individuals which have entirely consumed their contents, and contain nothing but air: the so-termed vascular, medullary, and liber cells; or those the contents of which have become converted into an isolated homogeneous matter, as the cells containing nothing but essential oil, resin, &c. The latter, however, are proportionately few in number.

"Here we have another point, which has been either entirely neglected, or only superficially and cursorily treated of in books, which for the most part do not even teach us any thing respecting the death of the whole plant. If we place the life of the cell wholly, or at all events for the greatest part, in the chemico-physical processes going on in the cell, we must term the cell dead in which these processes have entirely and for ever ceased. This is the case particularly in all cells which convey only air, which, being themselves dead, are saved from decomposition only by the living cells surrounding them, but which are instantly destroyed when exposed to the decomposing action of the atmosphere; as, for instance, the pith and heart-wood in trees becoming hollow, and cork and bark always at a certain time. There are, however, cells of this kind which gradually convert their whole contents into an isolated secretion, as into essential oil, as happens in the rhizomes of the *Scitamineæ*, in the leaves and stem of the Aloes, &c. In these cases the cell must be regarded as dead from that moment. The after-process is neither determined nor modified by the cell; it is a chemical process, and consists in the gradual oxidation of the essential oil, with the completion of which all farther change is at an end. It is in this way that the termination of the individual cell-life, even in the very interior of the most perfect plants, is indicated."—Pp. 104, 105.

"The life of the vegetable cell continues only so long as the chemico-physical processes go on within it, and these become impossible immediately that endosmosis is in any way arrested. The cell is then gradually destroyed by the action of the atmosphere, and decays, though in different ways, as it is exposed occasionally or constantly to the action of water. The causes of this death may be various,—laceration (as in the sporangia of the *Cryptogamia* on the escape of the spores), complete dryness, removal from the situation in which alone endosmosis is maintained (as in the fall of the leaf), &c.

"The process of dissolution of a dead cell does not belong to Botany; we willingly commit the inquiry into it to Chemistry, and refer to the latest and best works on the subject, by Berzelius, Liebig, and Mulder. The causes, however, which expose vegetable-cells to these destructive influences are of interest to us; and we may name among them, as a very general one, the impossibility of endosmosis. Every vegetable cell which can no longer take up fluid, in order to maintain the chemical processes within it, necessarily dies. Complete desiccation acts in the same way; and also the disruption of the cell, in consequence of which isolation of the materials contained takes place, and the processes going on within it cease. A peculiar state connected with this, is exhibited in most of the cells which are separated from a plant in the form of leaves. At the time of the separation they are evidently not yet dead, for, under a very favourable though extremely rare conjunction of circumstances, a new process of vegetation may commence in one cell or another, in such a way that an entirely new plant is thence produced. Commonly, however, they die altogether, it being no longer possible for them to take up fluids, which had been previously brought to them in consequence of their connection with the entire plant."—Pp. 105, 106.

The important subject to the physiologist is the observation of the phenomena of life in the plant. On this point the representations of Schleiden may be stated in the following manner.

First, As soon as cells are associated so as to constitute tissues, they present in their vital processes certain modifications which deserve particular attention. Part of these associated cells are shut out from immediate contact with fluids conveying nutritious substances; consequently these receive nutrition by endosmosis only from the contiguous cells, in which, however, the fluid has already undergone some change. There are no vessels for the distribution of the nutritive fluid in the bodies of plants; and Schleiden asserts, that no person would take the trouble of looking for them, or would imagine he saw them anywhere, but one who proceeds to the investigation of plants labouring under the erroneous notion in favour of the supposed analogy between them and animals. Every living cell which obtains fluid by endosmosis, immediately induces in such fluid a chemical change, and converts it into assimilable matter, so that the cells remote from the source of the raw nutritive fluid do not receive it in this state. In them, consequently, there is no occasion for the process of assimilation to be carried on, as far as relates to the decomposition of water and the fixation of carbonic acid gas. They enjoy, however, an active life, are nourished, form new cells, and perform other functions, as in the woody bundles of Dicotyledons. This view, he maintains, is sufficient to show how untenable is the law enunciated by Liebig, namely, that "no material can be regarded as the nutriment of plants whose composition is identical with or similar to their own, and consequently the assimilation of which can ensue without the separation of oxygen."* It is indeed remarkable that the Professor of Giessen did not perceive that this proposition cannot be a law, since it is contradicted by the phenomena of many fungi and true parasitical plants. It is merely one more example of the precipitancy of this chemical speculator.

Secondly, By the arrangement of a great mass of the cells in any plant, some of them are partially brought into contact with the atmospheric air. From this, two important conditions result. The first is, that the water is constantly evaporating from the surface of the cell in proportion to the warmth, dryness, and motion of the air, unless the cells are protected in some particular manner; in consequence of this evaporation, the fluid in the interior of the cell is continually lessened in bulk and concentrated, while endosmosis towards the cells is enforced and sustained. The second result is, that the fluid contained in the cells is enabled to absorb gases from the air, named carbonic acid and ammonia, and, occasionally oxygen.

"The conditions mentioned are of the highest importance as regards the life of the entire plant. Carbonic acid, ammonia, and water, constitute the chief nutritive matter of the cell, which, however, takes it up in various ways. Those cells which are in contact with fluid receive all the three substances at once. In this, consequently, must the most active assimilating process take place. Those cells which are partially in contact with the air obtain, it is true, on the one side, all necessary elements dissolved in water, but they can also receive, on the other side, carbonic acid and ammonia from the atmosphere. At the same time they give out into the atmosphere a larger or less quantity of water, by the loss of which their juices are concentrated, and this concentration again maintains the endosmosis. This enables us to explain how it is that after the bursting forth of their leaves plants no longer abound with such very watery sap, and yet continue the process of assimilation with greater energy. The perfect solution is conveyed farther by the endosmosis. The salts held in solution by the water and the inorganic constituents in general upon which the chemical forces of the cell have little influence or none at all, are carried with the water unchanged through all the cells until they reach the surface of the cells at which evaporation takes place. At this point, they of necessity gradually accumulate in larger quantity, which accounts for the greater residue after incineration left by the leaves, green bark, &c. The water evaporated from the cell, like all water when evaporating, carries away with it a small quantity of non-volatile substances, on which account the water perspired by plants is never quite pure, but is impregnated more with organic than with inorganic (less volatile) matter."—P. 108.

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* Organic Chemistry, p. 26.

It seems difficult to set limits to the effects produced on the interior of plants by this association and juxtaposition of innumerable cells. Dr Schleiden refers, lastly, to this agency, the formation of new distinct layers of cellular and intercellular substance, we understand, and the spiral arrangement of the materials constituting these layers, and many other phenomena previously considered. Peculiar changes, also, he observes, take place in the secretions, the more solid secretions assuming definite forms. Of this kind are the gelatinous envelope of many algæ, the intercellular substance which invests the spores and pollen-grains, and the matter secreted from the epidermis.

"Most *Confervæ*, several *Ulvæ*, &c., secrete a large quantity of gelatinous matter, which assumes a definite form, and thus frequently determines the figure of the whole plant, as in *Chætophora* and *Undina*. In most *Confervæ* it constitutes a delicate uniform membrane investing the whole plant; in *Rivularia*, *Chætophora*, *Nostoc*, &c., larger masses. It is always wanting, however, in the spore, and is not formed except by the vital activity of the self-multiplying cells.

"In the same way a solid substance is secreted in the intercellular passages: a similar secretion, of determinate form, is also found on the epidermis. The subject of both these secretions will be entered upon more fully hereafter.

"The most interesting and most complicated phenomenon, however, still remains,—that of the peculiar investment of the spores and pollen-grains. All spores (except those of the *Algæ*, many *Fungi*, and some Lichens), all pollen-grains (with the exception of those of plants which flower under water), are constituted of the proper, essential cell which is formed as such, and a peculiar material investing it, which is simply uniform or is furnished with warts, protuberances, spines, bands, or the most extraordinary abnormal formations, disposed irregularly or with the utmost mathematical regularity. The nature of this material differs from all known assimilated vegetable substances in this respect: that it is affected, according to Fritsche, not at all, according to others, but very slowly, by concentrated sulphuric acid, but is always rendered more opaque, and sometimes of a purple-red colour. The matter itself presents various colours, mostly yellow, though also blue, red, green, brown, &c. It is a pure product of secretion of the spore, or pollen-cell. I shall be obliged to say more about it afterwards, when speaking of the pollen. For our best information respecting its chemical nature, but especially with respect to its extraordinary forms, we are indebted to the indefatigable and astonishing researches of Fritsche. Mohl's opinion upon this point,—that the external pollen-membrane is intercellular substance, in which perfect cells or their beginnings (as granules) are formed,—appears to be completely contradicted by Fritsche's, Meyen's, my own, and Naegeli's investigations. The peculiar chemical nature of the material appears at once to be opposed to any comparison of it with the substances of which cells are formed."—P. 109.

As Dr Schleiden advances in his considerations on the life of the plant-cell, he becomes angry at the immense number and rash unfounded character of the hypotheses in which botanists have indulged their fancy in speculating on this subject, and expresses himself occasionally with a degree of severity, which we fear will rather bring some degree of ridicule on the subject. Under the head of the aphorism, or proposition, § 61, relating to the vital properties of the liber-cells, and of the milk vessels in the *apocynea*, a long commentary, written in this style, appears. It will be seen that in this, as in numerous other passages, he is quite opposed not only to all hypotheses, but, above all, to that which proposes to explain the phenomena taking place in plants by the assumption of a universal Vital Power. He allows that it is perfectly competent for any one to have recourse to this principle as a means of explaining phenomena in plants; but such a speculator must not imagine that in doing so, he is proposing anything profound, correct, or really scientific. The substance of what is delivered on this point may be stated in the following terms.

Regarding the movement of the *Latex* and the contents of the latex vessels, little correct information has been obtained. It appears that pretty generally the latex contains caoutchouc in granules, in greater or less quantity according to the age of the plant and the mode of its vegetation. Of the contents of the liber cells we know nothing at all. It is a peculiar character of this fluid, the latex, that it presents a great number of peculiar substances, most of them poisonous, and others of suspicious nature. Thus, the latex of the *Antiaris toxicaria*, *Hippomanes Mancenilla*, and *Excoecaria* is absolutely and strongly poisonous. The *Jatropha curcas* contains a poisonous principle, which is probably in the latex, while part of it furnishes starch and is used as food. In the young lettuce, he observes, the latex is innocuous, but becomes poisonous as the plant approaches to perfection. This, we presume, is stated of the *Lactuca virosa*. It is further known that various poisonous juices prove noxious to the plants by which they are secreted. Thus opium kills the poppy, and lactucarium is said to destroy the lettuce. In short, all vegetable poisons, and those which act as such on the plants by which they are furnished, are found in the latex.

From these facts, Dr Schleiden thinks, it probably may be inferred, that all the organs which contain these poisonous principles are for the purpose of receiving matters and preventing their reaction upon the living cells, which, if not so retained, would prove detrimental to the life of the plant. The author takes here occasion to demolish another notion of Liebig, namely, that in plants with milky sap the water is surrounded by an impervious case of caoutchouc, and that plants in a hot climate are thus secured against desiccation. This notion arises, he says, from complete ignorance of vegetable structure.

In the third book comes the subject of MORPHOLOGY, a new name intended to comprehend the knowledge of external configuration and parts, and of internal structure. Morphology, says Dr Schleiden, is the study of the forms of plants and of their several parts. It is divisible into a general branch and a special branch; the latter being separable into two parallel sections, namely, the delineation of external form, and the description of internal structure. This part corresponds with chapter fourth, entitled, The Individual Plant in the work of Mr Henfrey. The last author has stated the subject in such terms, that we think he is entitled to speak in his own person.

"Looking at vegetables in their generality," says Mr Henfrey, "we may say that a plant consists of three parts, the leaf, the stem, and the root; although in the lower classes it is often the case that one or even two of these are wanting. Advancing again, as in the case of the cell, we find that a plant may be composed of one of these individuals or phytons (φυτον), as they have been called, producing its like, the progeny immediately obtaining an independent existence; or the new individuals may remain attached almost to an unlimited extent, constituting highly compound plants, the different organs or phytons of which undergo very various modifications of form, and acquire very distinct functions. Thus in a flowering plant, or as a stronger example, in a forest tree, every leaf is to be considered as essentially a distinct individual; but as a member of a compound body working for the general benefit of the whole. In obedience to the requirements of this, they undergo modifications to fit them to execute distinct offices in the economy of the plant. Some are destined to the nutritive functions; others to the reproductive; and among these latter we find them still further losing their individuality and becoming blended in all their parts with their fellows, until almost all trace of their real origin is lost."

This he represents to be the substance of the doctrine of Morphology, the most important generalization in the whole science of botany.

The external forms of the parts of plants have received a large portion of attention from botanical observers; and to describe these external forms accurately, they have applied names borrowed from objects and implements in every sort of art, handicraft, and social and industrial occupation, and in every department of the natural world. Upon these names and their multiplied divisions and varieties, Dr Schleiden is extremely severe; and this cannot be matter of wonder. For however minutely these technical expressions might be employed, however necessary they might be in describing external characters, it is certain that they communicated no information to the mind of the student, and contributed in no way to his progress in the knowledge of the true philosophy of plants. Not the least of their evil has been the loading books with a multiplied and complicated nomenclature, which tended always to confuse the mind of the student, and which, though seeming to be knowledge, was little else than an idle display of names. Such nomenclature did not escape the observation of the poet of the realities of life long before they called down the present criticism from the botanical philosopher.

> "He showed the various foliage plants produce,
> Lunate and lyrate, runcinate, retuse;
> Long were the learned words and urged with force,—
> Panduriform, pinnatifid, premorse,
> Latent and patent, papulous and plane,—
> Oh, said the pupil, it will turn my brain."

Amidst several severe and not unjust criticisms, he winds up the whole by the following sentence. "By way of reference for all these useless, and in some degree foolish, designations, I would recommend Bischoff's little handbook of botanical technical terms as the simplest and most concise."

The presence or absence of the middle portion or stem, the typical *Phyton*, constitutes the most important distinction in the condition of plants; and on this ground the primary divisions are established.

Plants which have no axis or stem, but consist of cellular expansions, are called stemless plants. The filamentous, foliaceous, or cellular expansion is called *Thallus*, and hence the division has been called by Endlicher THALLOPHYTA. Plants which possess axis or stem interposed between the leaves and the roots, either simple or compound, are called after the manner of the same authority, CORMOPHYTA.

As every plant originates from a cell, the first difference among cells capable of affecting the form of their development is, whether these cells become at an early period isolated and independent; whether they remain for a longer period of time till their subsequent development merely as parts of the parent organism, as secondary cells within the parent cell. In the latter case, the propagating cells are enclosed within a parent cell (*sporangium*), while, in the former, they are contained free in a cavity of certain portions of cellular tissue (*sporocarp, anther cell*). Grounding his divisions on these circumstances, Dr Schleiden divides plants into covered-spored (*Angiosporæ*) and naked-spored (*Gymnosporæ*). Then the propagating cell may either develop itself freely to a new sexual plant (*Plantæ Agamicæ*), which, together with the *Angiosporæ*, are named *Cryptogamæ;* or it requires for its development to be previously encased by, and brought under the material influence of certain cells of the parent plant. This forms the class of sexual plants (*Plantæ Gamicæ*. Finally, this second large class are subdivided into *Pl. Athalamicæ*, and *Plantæ Thalamicæ*, or *Phanerogamæ*.

The following must be given in the words of the author.

"There are other characteristics denoting the internal and external form of developed plants, which coincide in a remarkable manner with those above given, and derived from the law of development; these have been already partially, but very imperfectly, treated of. The *Angiosporæ* may also be termed cellular plants (*Pl. cellulares*), since they afford no indication of a current of sap passing through definitely arranged elongated cells (vascular bundles In like manner, their external form may be defined as stemless *P. acaules*, *Thallophytæ*, Endl.), as we have not hitherto been able to detect any sharply defined morphological contrast between a lateral parenchymatic extension (leaves), and a body uniting these (stem In contradistinction, the *Angiosporæ* are designated as vascular plants (*Pl. vasculares*), and as plants having stems (*Pl. caulinæ*, *Cormophytæ*. Endl.) The divisions of the *Gymnosporæ* would correspond to plants having simultaneous and progressive vascular bundles and plants with or without an apparatus for propagation, and, finally, characteristics drawn from the nature of the vascular bundles, and the morphology of the flowering portions of the plant might perhaps be added to the Athalamic and Thalamic orders, but, unfortunately, we are still deficient, especially with respect to the *Rhizocarpeæ*, in the more accurate investigations necessary to guide us. We cannot too frequently repeat, that all our subdivisions are, and must be, regarded as merely provisional, and as extremely deficient, as a correct classification can only be derived from a complete knowledge of the law of comparative development, from the attainment of which we are still infinitely far removed. All that we can say is, that all divisions grounded upon characteristics which appertain in their nature only to a definite stage of development, and do not stand in the most immediate connection with the developing process, must either be decidedly false, or, at best, simply accidental, and do not by their own value constitute the natural groups. On the other hand, every classification must remain permanent that has been derived from characteristics depending upon the law of development. Thus the line of demarcation which has been laid down between the *Cryptogamia* and the *Phanerogamia* will ever continue, even though these divisions may not always be regarded as those possessing the highest importance. The recent attempts to range the *Cycadaceæ* under the head of the Ferns rests on such erroneous conceptions of vegetable nature, and are based upon observations of so inessential a kind, that they cannot be long maintained. In the same way, Monocotyledons and Dicotyledons will always remain separated, and, notwithstanding all the substitutes that have been proposed, tried like some new article of fashion, and then rejected, as *Endogenes* and *Exogenes*, *Amphibryæ* and *Acramphibryæ*, *Loxinæ* and *Orthoinæ*, *Exorhizæ* and *Endorhizæ*, &c., we shall still have to return to the old division, as being the best and most applicable of all, because it rests upon what is most essential in the morphological law of development. It is only to be lamented that so much valuable time and such fine powers, which might be devoted to well-grounded observations on the law of development, and consequently to the special furtherance of science, should have been wasted in this utterly useless game of system-making."—Pp. 141, 142.

The ANGIOSPORÆ comprehend the ALGÆ, FUNGI, and LICHENS. It has been impossible hitherto to determine whether the CHARACEÆ should be referred to the Angiosporæ or the Gymnosporæ.

The GYMNOSPORÆ, it has been already stated, form two great divisions, the asexual and the sexual plants.

The asexual are subdivided into plants void of root, as the liverworts and the mosses; and plants having root, as the club-mosses, the ferns, and the horse-tails.

Then comes the division of what are called sexual plants. Of these the thalamic include the RHIZOCARPEÆ, comprehending such plants as the *Pilularia*, *Marsilea*, *Salvinia*, and *Azolla*. The structure of these plants is simple. The stem consists of a central vascular bundle, with some spiral vessels and a bark, in which runs a circle of large air-tubes, covered on the outer side by a simple layer of cells as in salvinia, or by several layers as in *Pilularia* and *Marsilea*.

Through all these divisions of plants a progressive advancement from simplicity to complication may be observed, from the angiosporæ up to the large and well known variety of phanerogamous plants. This scale of organic construction Dr Schleiden endeavours to explain in the following passages.

"1. The cell is the simple element; it is the whole plant, without organs, and uniting in itself all physiological forces. *a*. Gradually, in portions of it, or in the next stage, where several cells are combined, though as yet in exceedingly indeterminate forms, in entire individual cells, we note the appearance of organs (*sporangia*) which are especially devoted to the formation of reproductive cells, the spores. *b*. The form of the cells combining to constitute a plant remains still undefined, but several of these *sporangia* combine in a definite form as a sporocarp; and, lastly, *c*. In the Lichens the spore becomes perfected as an independent organ, by the addition of a special coat. (The *Charæ* remain still inexplicable.)

"2. Nature advances, causing the cells to combine into determinate, fixed, elementary forms, in fact, into stem and leaf, at the same time retaining the sporocarp, which develops in its highest complexity, and essaying the formation of a new organ essentially consisting of a large cell enclosed in an ovate, cellular body, to which at this stage no definite function is delegated. Neither this nor the sporocarp stands in definite relation to stem and leaf (but there are still important deficiencies in our observations). Lastly, the sporocarp and that other organ become surrounded by leaves, which are modified in definite gradations, forming a flower (Mosses and Liverworts).

"3. Through the *Lycopodiaceæ*, Ferns, and *Equisetaceæ*, the sporocarp becomes continually more definitely connected with the leaf, and the development of the sporophyll (spore-leaf) into a peculiar modification (the anther of the *Phanerogamia*) progressively more clearly marked. In its highest condition in the *Equisetaceæ*, the physiological opposition of leaf and stem, which has been completely unfolded in the *Lycopodiaceæ* and Ferns, appears to retreat again. In *Equisetaceæ* and *Lycopodiaceæ*, nature apparently drops for a time that second organ mentioned in the Mosses; here, however, there is again great want of observed facts.

"4. This is again taken up in the *Rhizocarpeæ*, and a definite physiological function attached to it; it becomes the seed-bud (ovule); and the sporocarp the anther; leaf and stem remain as morphologically and physiologically distinct organs, without, however, the reproductive organs being determinately divided between them (but here, again, there is great want of investigation).

"5. Lastly, in the *Phanerogamia*, nature again takes up all the separate successively evolved and gradually completed elements, and combines them into a perfect plant. Leaf and stem, morphologically and, in general, physiologically separated, form the entire plant. The stem is developed at certain points into perfect seed-buds with definite function; the leaf, in like manner, into perfect anthers; and both become enclosed in definitely modified leaves, and constitute perfect flowers. Now, however, but with a constant retention of the *essential*, a wide field is opened for the development of the separate parts into varied forms, under which circumstances even particular earlier stages of individual organs reappear; for instance, the leafless stem, flat in *Lemna*, solid in *Melocactus;* the sporophyll of the Ferns in the *Cycadaceæ*, perhaps even the development of the anther out of a stem organ (?) in *Caulinia fragilis*, the stem of an *Equisetum* with the function of a leaf in *Casuarina*, *Ephedra*, *Cacteæ*, &c.

"I have here only insisted on the main points, in order that the survey might be more easy, but there are many others which might be traced out in the same manner. In the Mosses, for example, the stem originates as an organ morphologically bounded at one extremity; in the Ferns, &c., morphologically limited in two directions, as stem (*sensu stricto*) and root; but in neither exists any relation with the two ends of the spore-tube. This relation first appears in the *Rhizocarpeæ*, and in the *Phanerogamia* it becomes so perfected that the stem, without exception, originates from the penetrating, closed end of the pollen-tube, and the root from the opposite extremity."—Pp. 211–212.

It should be here mentioned, that the *Cormophyta* or stemmed plants may be divided into three great classes, according to the condition in which the embryo, or new plant, is found at the period of its becoming independent of the parent plant.

I. In the lowest class, the embryo or spore appears as a simple cell or congeries of cells, and it is only in germination that this acquires the three divisions or merithals; (*μεϱος pars; θαλλλω floreo*). This forms the Acotyledonous plants.

II. In the next class the embryo is composed of a single phyton. In this may be recognised parts corresponding to the foliar, the cauline, and the radicale menthals; the organ which represents the leaf is called the cotyledon or seed-leaf, and encloses the cauline portion. This constitutes the Monocotyledonous class or those with one seed-leaf.

III. The third class presents a more complex embryo. It is formed of two or more phytons cohering together, the cauline portions being applied face to face. This forms the character of the Dicotyledonous family of plants.

The characteristic differences of these three great divisions are shortly yet ably given by Mr Henfrey in the fifth chapter.

The division of monocotyledons and dicotyledons thus applies only to the phanerogamous plants. Dr Schleiden regards it as merely provisional.

Dr Schleiden then proceeds, after impressing the importance of distinguishing between general morphology in the history of the external forms, and that part of special morphology which proposes to unfold the internal structure of the different organs, as well as their relation to each other, to explain the anatomy of the phanerogamous plants under the five following heads,—A. Radical Organs, the Root and its appendages, Rhizomata, Tubers, and others; B. Axial Organs, the Stem and its parts; C. Foliar Organs, the leaves and their varieties; D. Bud Organs; and E. The Flowers; the latter in great detail. Our limits prevent us from giving even a sketch of this part of the subject, which indeed should be studied in the work, and attentively. We feel it requisite, however, to introduce the following observations on the divisions now mentioned, and the use of the term stem, and its supposed subdivisions.

"I. The arrangement of the cellular tissue is effected exclusively in the first stage, and, in all probability, is conditioned;—

"1. By the arrangement of the secondary cells in the mother-cells. If they mostly lie in a linear arrangement in the long axis of the stem, an elongated internode originates; if they lie mostly towards the angles of a tetraedron, an undeveloped internode; lastly, if they lie chiefly in one plane, this plane may stand at right angles to the axis, and the internodes will be much developed in breadth, or, it may be parallel to the axis, and thus form a stem flattened on two sides.

"2. By the form of the process itself, since this ceases in some situations earlier than in others.

"*A*. The first distinction to be seized here is that between Monocotyledons and Dicotyledons in general, depending on the division into definite and indefinite, or closed and unlimited, bundles. In the Dicotyledons the process of cell-formation never ceases on the outside of the vascular bundle, whence the individual internodes, so long as they live, continually increase in thickness; while in the Monocotyledons the process of cell-formation—1. ceases regularly from below upward, in the individual vascular bundles, and thus a thickening of the individual internode by their means becomes impossible; but the increase of thickness of the axis itself may be attained by the increasing diameter of the successive internodes (as is shown more fully under *D*), and thence, when it rises perpendicularly in a cylindrical form (if it be such as is represented under *B*, or under *D*), it receives no increase of thickness from that time; or 2. a layer of cells beneath the periphery of the axis retains its capacity of development, and these continually increase the thickness of the axis by their uninterrupted production of new cells, since in the newly-formed tissue vascular bundles are simultaneously continually developed. This process occurs, however, only in the Monocotyledons with undeveloped internodes of a branching type, in *Dracæna*, some Palms (*Cucifera thebaica*), and *Aloineæ*. This second process of formation bears some resemblance to that of the Dicotyledons, in so far that in both a connected layer of cells remains capable of development around the whole periphery. In both, the newly originating cells assume two forms, one portion joining the cellular tissue between the vascular bundles, while another portion belongs to the vascular bundle structure. But the essential distinction remains in this, that this latter portion only increases the existing vascular bundles on the outside in the Dicotyledons, while in the Monocotyledons, on the contrary, it becomes transformed into new isolated bundles.

"*B*. If the process of formation advances regularly from below upwards, while a definite plane of the basis ceases to produce cells, a cylindrical ascending axis is produced. In elongated internodes this is always the case; therefore every internode may be clearly separated from the axis by two cuts.

"*C*. If the process of cell-formation ceases somewhat earlier in particular situations in the circumference than in others, the result is the formation of axes with projecting angles; for instance, three-edged quadrangular, &c., stems. This condition is most striking when the process of formation ceases very soon on two sides, so that a two-edged stem is thus formed, which very often represents quite a thin plate, and is frequently taken for a leaf, on account of the mistaken notion of regarding the conditions of dimension in space as among the characters of special organs. The best examples are afforded by *Ruscus* and *Phyllanthus*.

"*D.* If it endures longer at the circumference than in the middle, the following results present themselves. In the usual conical form of the terminal bud, the process of cell-formation does not, in this case, occur throughout the whole cone, but only its outer layers, so that the whole free surface of the cone contains the youngest cells: the whole of the core of the cone is made up of the older. Here the axis usually rises upward in a cylindrical form, not, however, by means of discs equally deposited upon one another, as in *A*, but by hollow cones applied over each other. Every new internode is itself a hollow cone of this kind, and therefore cannot be detached from the axis by a vertical section; it can only be removed by a section following the course of a conical surface. If the process of cell-formation persists somewhat longer in the succeeding internode than in the preceding, a longer hollow cone is produced, which, consequently, stretches out over the base of the former, which should properly be free; and thus the new internode becomes broader in proportion to the former, so much so, that the free borders of the successive internodes, instead of lying in a vertical cylindrical surface, form a horizontal surface (*e. g.* very often to be observed in *Melocactus*), or, in smaller degrees of projection, lie in a hemispherical surface, having its convexity directed downwards (as, for instance, is seen in most stems which are tolerably thick and enduring, in the first or next succeeding internods, *e.g.* in *Zea Mays*, &c.)

"*E.* Finally, the forms become most striking where the cell-formation ceases at the border earlier than in the centre; directly the opposite of what occurs in *D.* This seldom happens in a single internode; it is usually found where several very short, undeveloped ones, united together, form but a mere disc. When, for example, a disc or a bluntish cone has originally been formed, and the extreme margin loses the power of development, while the newly forming cells in the middle continue to arrange themselves into a flattened form, the border will at first be capable of yielding to some extent by the expansion of its cells; but this soon ceases, and it must become elevated, while the centre gradually develops itself into a hollow form, in the same way as a plate of lead becomes hollow when it is beaten out in the middle and not at the edges. According as the time the process of cell-formation lasts, proceeds quickly or slowly, and according as the arrangement of the newly produced cells is restricted a longer or shorter time to the same plane, does the excavated form become very different. From the quite convex internodes which bear the florets in *Anthemis*, through the flat disc of *Helianthus*, the concave disc of *Dorstenia*, to the longish cup-shaped disk, almost closed above, of *Ficus*, we meet with almost every gradation; in like manner we see the same from the convex fruit-bearing internodes of *Potentilla*, through the cup-form in *Rosa*, to those completely closed and blended with the ovaries in *Malus* and *Pyrus.* So that it may be clearly seen, and I here call particular attention to the fact, that, in all these hollow forms, the deepest point in the interior of the cavity corresponds to the terminal shoot;

consequently it lies indeed mathematically lower, but organically higher, on the axis than the internal walls of the cavity and the margin; thus the lowest flowers in the Fig are the youngest, like the innermost in *Helianthus*, the uppermost in *Anthemis:* equally are the lowest carpels in the fruit of the Rose the youngest foliar-organs; the petals and calyx standing on the margin the oldest. In the same way, lastly, the lowest carpels in the Pomegranate stand organically higher on the axis than the upper and larger carpels. One must not let the contradiction between the geometrical definitions of space and the organic relations lead us into error; but get a clear apprehension of this peculiarity. Only too readily are many authors to be noticed to whom this relation has never become clear; and thus, much else in the inflorescence and structure of blossoms remains to them obscure, and as a strange peculiarity, which a more correct apprehension renders very simple and natural. I shall have to enter more specially into this hereafter, when speaking of the blossom. This condition occurs, indeed, most strikingly in the internodes in the vicinity of the floral organs, but by no means exclusively, for it appears also earlier, as in *Melocactus*, *Echinocactus*, *Mammillaria*, &c., where the end of the axis exhibits an infundibuliform, or a cup-like form, and the terminal bud stands at the bottom of it, much lower than the ten or more preceding internodes.

"II. In the second stage above distinguished, the equal expansion, in all directions, of the cells formed in the preceding stage, can alone act, since, still wholly imbued with moisture, the cells must be nourished tolerably equally on all sides. In this period, therefore, the volume may indeed alter, but not the form or relation.

"III. In the third stage, lastly, the expansion of the existing cells is exclusively for the purpose of giving form. For the most part, indeed, expansion of the cells according to their kind is conditioned by the first formation in the first stage, since the cells become most intimately united in the directions in which they were in contact in the mother-cell; therefore, in other directions they are more loosely connected and afford less facility to the passage of sap, and consequently to nutrition. Certainly, so far as our yet imperfect observations reach, it is especially only the elongation of cells in the direction of the axis which essentially conditions and produces the form of the *developed* internodes; especially, therefore, do we find it connected with the conditions mentioned in *A* as existing in the first stage. If we measure the length of the cells in an internode (*e. g.*, in *Arundo Donax*) which has just entered the third stage, and afterwards the length of the cells in a full-grown internode, we find at once that the expansion of the cells is quite sufficient to account for the elongation of the whole internode. Since, however, the cells enlarge unequally, we must only measure those in the middle; the result would be too small in the upper cells, and too great in the lower. The former expand less, and cease sooner: the latter, on the contrary, elongate more powerfully, and continue for a longer time to enlarge in the direction of their length:

hence the so unfounded notion of many, that the internodes grow for a longer time at the lower end than at the upper.

"All that is brought forward and enlarged upon in these paragraphs, relates, of course, principally to the formation of the axis of the simple plants (of the second order), in which all the conditions described can actually occur in nature: it has also its application to those simple plants which originate as buds upon one another, whether these become detached and continue to grow, or, remaining, form a compound plant with that on which they have been produced. Here, again, it is seen, that, as in the simple plant, every single internode is capable of development independently into a special form; still more, the axes of the simple plants, in their combination into a compound plant, are independent of one another, and may assume wholly distinct forms, the combinations of which again are then specifically definite for plants and groups of plants.

"In all this exposition, moreover, I would and could give nothing further than a general indication as to the course which nature here appears to take. Manifold as the researches on this point I have made are, and I believe they have been sufficient, provisionally, to justify what I have here published, yet must far more comprehensive and fundamental investigations be entered upon on this subject before the study of it can be brought at all to a conclusion. At present I know not of a single at all profound history of the course of development, even of any one stem; and hence it may readily be imagined how insufficient that must be which I alone have been able to work out in reference to this point. I have, however, indicated the necessary course of the investigation, and correctly exposed the question; the future alone can solve it, by the co-operation of many skilful powers."—Pp. 225–228.

The following commentary refers to the endless multiplication of terms in botanical nomenclature, and to the loose and magical manner in which things essentially different are confounded, while idle distinctions are drawn between objects which admit them not.

"*History and Criticism.*—As, in the foregoing has been mentioned and too often indicated, the whole study of the stem suffers from the same errors as the other parts of botany. The word stem has only an abstract meaning to most botanists, and thus is altogether useless in a scientific point of view. Here, as everywhere else, there is a want of accurate definition of ideas, because guiding rules for, and scientific regulation of, the process of definition are absent. Without a history of the course of development, and a definition of the conceptions obtained from this, we remain in this case, as in every other, without any fixed point, and cannot get beyond empty talking. One of the old school, for instance, says the stem (*stirps*) is divided into stock (*caudex*), trunk (*truncus*), stalk (*caulis*), Rush-halm (*calamus*), culm or haulm (*culmus*), scape (*scapus*), &c. When we divide in science, two things must be observed: first, that we divide according to *one* principle; secondly, that this principle be selected with reference to a purpose. The latter is to be determined inductively; the former is a purely logical inquiry, and its neglect a wholly inexcusable logical blunder. In this point, those common subdivisions are in the highest degree bad: they have no regulating principle whatever, and are quite as senseless and unscientific as the subdivision of vegetables in general into grasses, trees, roses, yellow flowers, green stalks, and plants. I should like to see, for instance, how the stalk (*caulis*) is to be distinguished from the culm (*culmus*) of grasses without anatomy, or on the contrary, what anatomical characters one could find to distinguish the *scapus* of *Hemerocallis* from the *caulis* of *Lilium candidum*. It is quite a ridiculous misconception to treat of the *scapus* under the head of stems, since the sole character we can find for it is that of bearing flowers, consequently it is properly a flower-stalk or an inflorescence. Under these circumstances, then, it belongs to the inflorescence and not to the stem; *spadix* would be just as much a form of stem as *scapus*, *calathium*, &c.

"With regard to the second point, I have already expressed and brought forward proofs of my views, that in botany we must unreservedly maintain the morphological principle as the highest. Therefore, we must derive the subdivision from this in the first place, and once more the course of development may alone be our guide.

The mode of speaking in question is altogether without scientific ground in another aspect. *Calamus*, *culmus*, *scapus*, &c., are quite isolated phenomena, occurring in certain plants, isolated groups, sometimes not in the whole of the group, and therefore they do not belong to general botany, but merely to quite special parts of it. The Grasses have special forms of stem just like most other families, and it is merely a proof of logical confusion when a part of these forms are treated as something general in general botany, which, if (as, however, has never happened) they are not designated as Monocotyledonous stems, have no marks of distinction from many other forms, nor even as Monocotyledonous, if, for instance, we place together the stem of *Mays* and *Tradescantia*. General botany has nothing to do with all these peculiarities; and to treat them here, instead of directing attention to the fundamental laws of the development of form, is but a certain means of wholly confusing the learner, and giving him a barren host of words under the name of science.

"Hence arise the many wholly fruitless contests, with which time and paper are wasted, as to whether a thing is *calamus*, *scapus*, &c. I am inclined to look upon those who would wish to distinguish them as if they said,—*calamus* is the *scapus* on the *Cyperaceæ*, &c. Every discussion, without strictly scientifically defined conceptions, remains ever a useless bandying of words, necessarily devoid of results. Just one example may be brought forward here. Link says, 'The main stock (*caudex*) consists of parts growing *upwards*, which are called trunk and stem; and of parts growing downwards, the roots. The main trunk is that developing from the embryo; those which are developed from the buds are exactly like this, are called branches, and also grow upwards. Flowering stalks are branches. The trunk grows upwards after it has taken root.

since originally the germ grows downward, sends out roots, then it directs its other extremity upwards and grows in that direction, having grown downward previously.' Next come definitions of the ramification of the trunk. 'The direction of the ascending trunk is at first vertical, but it not unfrequently takes another direction afterwards.' Different directions of the trunk and branches: 'The length of the true trunk is at the same time its height, since the long prostrate trunk of *Calamus Rotang* is a runner. The tall Palms have a *cauloma*. The stem of the Grasses originates in a different manner from what of the other Monocotyledons. The germ (*keim*, this is the name Link gives the cotyledon) is wholly wanting, or a scutellum appears in its place, which, *without bud* (!!), passes directly into the stem, which sends out roots below and grows upward above. I should wish to retain the name halm solely in reference to the following. The thick stem of *Mays* is very peculiar, proceeding as out of a bud, from the apex of a stem exactly like the former, between the leaves. I would wish to call the upper stem halm, did this not differ so much from the customary language, therefore I rather give this name to the former. This stem has a twofold analogy with the stem and with the germ (*cotyledon*) of the other Monocotyledons.' Later on follow the so-called anamorphoses of the trunk. 'The cauloma (palm stem) occurs only in the Monocotyledons, and originates from leaves, which emerge one out of the other, and, in fact, from their sheaths. Merely a slender (!!) filament of stem unites these leaves. The number of leaves increases unceasingly, and thus the cauloma acquires increased thickness. But then that slender stem grows larger, since new parenchyma is formed, and in this new ligneous bundles. Thus the cauloma does not become thickened upward, but retains exactly the same diameter; nay, the lower portion is not unfrequently thinner than the upper, on account of the withering leaf-sheaths. The cauloma grows slowly, and plants which have it remain a long while devoid of stem; sometimes they never acquire one. The Duckweeds have a very short cauloma, which grows out into a stem.' Next comes a third anamorphosis, the corm! The bulb is to be reckoned with this. Fourth anamorphoses, the rhizome. 'From the base of the trunk, under ground, stems often come out which grow downward *from the first*,' &c.

"What are these anamorphoses? Are they stems, or not? If they originate from stems, what forms of stem precede them? What is the common character of the stem and its anamorphoses? what is its universal distinctive mark? To all the questions which immediately crowd into every even half-logical head, not one answer is to be found. But I think I have given enough of this. Superficial treatment of imperfectly observed facts characterises the whole of this exposition. Moreover, there are very many botanical manuals in which all is still more illogical and unscientific than here, and this may suffice for a general criticism of the whole existing literature of the stem.

"No one has hitherto sought to elucidate the structure of the axis from its course of development; but, instead of this, space has been given to the strangest fancies, and it has even been asserted that the stem is nothing but a number of petioles grown together. One may, indeed, calmly declare that the people who assert such a thing do not understand themselves; since, otherwise they would see that when they assert a blending together, they must point out, that is, demonstrate, how two separate parts become united by the process of growth, while they have not yet made one single search for such, the only possible demonstration. The investigation would clearly at once refute the affair. A portion of these men might readily come to their senses if they were only to trace one complete course of development. There is another portion, however, whom this will not render capable of clear vision. These are the people who think that they are able to make the forms with their words, instead of receiving them from nature. They do not suspect that natural history definitions, as a rule, are not artificially pieced together, but discovered inductively; and they feel themselves very clever when they can assert that the stem, which has always been an undivided whole, can still be regarded as compounded of petioles, although such is not the case. To this class Gaudichaud appears to belong, whose so-called new theory amounts to the harmless joke, that in future we are not to call the plant a plant, but a leaf; the leaf not leaf, but foliar-part leaf; the stem not stem, but stem-part leaf; and so on. I think we ought not to interfere with anybody's pleasures; but this is not science. Finally, we have a third class of naturalists, with whom there is no contending, who appear to have chosen their motto from St Augustine; '*Credo quia absurdum est.*' These look down with a shrug upon the poor empiric who sees no more in things than his senses, his logical intellect, and his healthy reason show him. They argue thus. Just because the impression shows us the stem first and the leaf afterwards, it must be directly the opposite in the spiritual perception, which is directly opposed to the dim-eyed and rude perception of sense. These are the people who have bestowed upon us the nonsense of ideal abortions, and ideal blendings of parts, &c. There is no contending with them, because they recognise no conformity to the law in our intellectual powers, consequently no deciding rules and no forum."—Pp. 225–232.

It is known that the term Rhizome (*Rhizoma*) is often used rather loosely, as almost uniformly, by this name, every possible part of a plant that ever is under ground is understood; and though the word is in general use, no one knows what is meant by it. Dr Schleiden defines and restricts the term in the following manner. The main axis of a plant very often dies soon after it has become developed out of the embryonal condition, while one or more of the lower lateral buds continue to grow horizontally, beneath or above the surface of the soil, without ever erecting themselves, the axes proceeding from the lateral buds alone rising up free in the air. To these horizontal axes proceeding from lateral buds, he applies exclusively the name of *Rhizoma* or root stock. As examples, he adduces *Pteris aquilina*, *Equisetum arvense*, *Phragmites communis*, *Carex arenaria*, *Gratiola officinalis*, *Dentaria bulbifera*, *&c.*

Annal bark.—In the Dicotyledonous plants, this consists, besides the epidermis, of three portions,—the external cortical layer, the internal cortical layer, and the liber layer.

The liber layer is not always present. When present, it consists of isolated liber cells, or liber bundles, as in most dicotyledonous trees, both being distributed in the cortical parenchyma, generally in such manner that their course corresponds accurately to that of the vascular bundles, or it is composed of a more or less accurately closed circle of liber cells, as in the lilac (*Syringa*) and ash. With the liber cells are occasionally found milk vessels or passages, as, for instance, in *Rhus.*

On the external cortical layer, the following observations deserve attention.

"The external cortical layer has hitherto, as far as I know, been entirely overlooked; it appears, nevertheless, seldom to be wholly absent, and in a large number of plants, and groups of plants, it is so distinctly characterised, that it quite forces itself upon one's notice. It is only in a few plants that it has met with any attention, and there it has been described as a liber-bundle, although it really differs very materially from liber. The following are the characteristic marks of this tissue, as distinctive from cortical parenchyma. The cells of this layer are always vertical, elongated, very thick-walled, but soft, and so far similar to the liber-cells; they are, however, always applied *upon* one another by *horizontal* walls, seldom exceeding $\frac{1}{200}$th of an inch in length. They almost invariably exhibit more or less large pores, which frequently form distinct, beautifully ramified canals in the thick walls; they contain little or no chlorophyll, but merely homogenous, colourless, or sometimes reddish juices, and here and there crystals. The cells are always connected together by intercellular substance, and their limits therefore frequently obliterated, so as to make them appear like apertures in a soft pulpy mass; when the cells are separated from each other, the intercellular substance shows itself with remarkable distinctness between them, as a secretion from them. This layer is found in many plants most strikingly developed, and sharply defined from cortical parenchyma, although in various modes of distribution:—1. As a perfectly closed layer (penetrated in some cases only by small canals opening into stomata), as in most of the *Cacti*, *Melianthus major*, *Euphorbia splendens*, *Syringa vulgaris*, *Begonia argyrostigma*, *Ailanthus glandulosa*, *Rosa*, *Aristolochia Sipho*, *Piper rugosum*, *Cacalia ficoides*, *Cotyledon coccinea*. 2. Divided into many bundles, so that the green cortical parenchyma reaches the epidermis between them (in which case we find stomata there), as in the *Chenopodiaceæ*, *Amaranthaceæ*, *Malvaceæ*, *Solanaceæ*, *Umbelliferæ*, *Justicia*, *Eranthemum*, &c. 3. Where it may be quite distinctly recognised as a special layer, but still passing quite into parenchyma at the borders, as in *Carya*, *Pyrus Malus*, *Pavia*, *Hedera*, *Acer*, *Daphne*, *Ptelea*, *Rhus*, *Viburnum*, *Cornus*, *Ficus*, *Sempervivum globiferum et laxum*, *Sedum pallidum*, *Cotyledon arborescens*. 4. More completely merging into cortical parenchyma, and therefore less distinct, as in *Ribes*, *Alnus*, *Elæagnus* *Juglans*, *Populus*, *Salix*, *Carpinus*, *Castanea*, *Corylus*, *Quercus* *Cytisus*, *Cornus mascula*, *Sambucus*, *Rhamnus*, *Tilia*. 5. Finally, I have found this layer either entirely absent, or only to be recognised in the external cellular layer, as in *Cheiranthus*, *Hippophäe*. *Mesembryanthemum*, and the so-called tree-carnations. On the whole, the external cortical layer seems to stand in a definite relation to the formation of cork, and to be more sharply defined in proportion to the tardiness with which the latter appears (as, for instance, in *Cactaceæ*, *Aristolochia Sipho*, *Cacalia ficoides*): the contrary, however, also occurs, as, for instance, in *Mesembryanthemum*."—Pp. 240, 241.

The structure of the stems of plants, and the question as to the mode in which new matter is annually deposited in the trunks of trees has occupied much attention among botanical observers, but, according to the present author, has given rise to little or nothing but fanciful hypotheses. The manner in which he deals with the celebrated distinction of Endogenous and Exogenous plants may be understood from the following passages.

"Two notions regarding growth and enlargement there are especially, which have long sadly confused our science, from which a correct method would have completely saved us, since both were, at least at the time, and in the species on which they were built up, wholly unfounded fables, having no connection with any guiding principles, and consequently never should have assumed scientific perspicuity, much less, as did happen, have served as a temporary basis for theories pervading the whole science of Botany.

"The first is the idea of Desfontaines of the distinction between Monocotyledons and Dicotyledons, that the former develop new structure in the centre of the axis, and grow in the inside (*plantæ endogenæ*), while the latter produce ligneous substance close under the bark, and deposit it on the inner side, and thus grow on the outside (*pl. exogenæ*). All this had no greater foundation than the fact that in the Monocotyledonous axis the vascular bundles are farther apart in the centre; consequently, in the preponderance of parenchyma, the substance is more lax. It was not ever attempted to make even a superficial observation of the process of growth; if it had been merely observed that the vascular bundles going to the lower leaves, consequently the older, crossed those going to the upper leaves, which must be the younger, a child might have been made to understand at once that a growth of new vascular bundles in the interior was an absolute impossibility. Nevertheless, upon this empty fancy, which a child might have refuted, De Candolle built a grand system of vegetables, which it never did require the distinguished and comprehensive researches of Mohl to overthrow.

"The second notion is that of Du Petit Thouars, which was not less ill-grounded, which, as expressed by him, would be upset by every, even the most superficial observation, and even in its more refined subsequent statement is by no means established, but has important and apparently irresistible objections against it. Du Petit Thouars thought that all increase of thickness of the axis resulted from the descent of roots from the buds. Such a crude notion scarcely required refutation. On the other hand, it was afterwards stated that the formless but organisable substance (the cambium) was gradually organised from the buds downwards. The only possible foundation for this view, namely, evidence obtained by thorough investigation of the history of development, is still due from all its assertors, the latest, Gaudichaud, &c., included. Therefore it is already to be set aside as devoid of foundation. But the contrary can be made good, that, in the first place, no cambium ever exists as a formless fluid in the plant, unless we would so call the cytoblastema enclosed *in the cells*; secondly, that, so far as observation at present reaches, cells are always formed in cells, that this cell formation, according to the observations I have made in the *Cactaceæ*, &c., progresses from below upward; thirdly, that the axillary bud is already formed in the terminal bud before the axis begins to increase in thickness, and that certainly the cells of the bud are organised into vascular bundles from the vascular bundles of the stem upward into the bud, and not in the reverse direction. By these remarks, the whole notion seems to me to be for the present set aside, and it would require quite other support than that which Gaudichaud's imperfect attempts in anatomy and physiology could give it.

"Lastly, I must notice the most recent views of Martius on the structure of the stems of Palms, &c. Martius asserts, that here the vascular bundles, the primary structure of which is sketched out in the conical terminal bud, on the whole, as I have already explained it (Wiegmann's Archiv. 1839, 219), do not merely grow upwards into the leaves, but also downward, by their lower end, in the stem. These facts I must entirely oppose from my own observations. Hitherto I have never had an opportunity of investigating living Palms, or more than small fragments of dead ones. But from what I saw I believe I may venture to conclude that the stem of Palms does not essentially deviate in such a way from those of other Monocotyledons, that one may not transfer to the Palms, in the main points, the laws of structure found there. Now, so far as I know, such a process of growth does not occur in *any* Monocotyledonous plant. According to my observations, the newly produced vascular bundles merely grow continuously upward. In advancing the distinction of limited and unlimited bundles, Martius follows me, but, in my opinion, he has not conceived nearly clearly enough the distinction between developed and undeveloped internodes, and in particular he has not formed a clear conception of the peculiarities of the stem with undeveloped internodes, and the conditions of structure resulting therefrom. Moreover, he has left the meaning of the term onward growth (Fortwachsen) of a vascular bundle equivocal. If it means that the already existing elongated cells become transformed into vascular bundles, it describes no peculiar process of growth,—the vascular bundles were already to be distinguished in their elementary condition; but if it means that the cells themselves, of which the vascular bundles are composed, are produced subsequently, originating above first and proceeding downwards, this is, I believe, erroneous. It is necessary to bear in mind, the essential distinction between Monocotyledonous axes, with and without a cambium circle, in order to understand these structures. Where no cambium exists there are no other new cells formed besides these in the point of the bud. But where there is cambium, all development, and so also the development of new vascular bundles in the stem, proceeds upwards and outwards, never, so far as I have been able to observe, downwards or toward the interior. The lowest and innermost cells are always the oldest, never the upper or outer (of course excluding the bark, to which, alone, an endogenous growth can be ascribed). I must, therefore, distinctly assert, that in the Palms, as in all Monocotyledons, the lower end of an older vascular bundle never reaches down into an internode lower than that in which the lower end of its first rudiment originated."—Pp. 256–258.

The next subject to which we direct attention, as well exhibited by Dr Schleiden, is his account of the parts of the flower at the time of blooming.

"§ 144. The flower originates from a bud (*gemma*, here commonly termed *alabastrus*), and is nothing more than a particular modification in the perfecting of the parts contained in the bud; namely, the several foliar organs and internodes. It has been al-already shown, that only two essential processes of development, and from those only two essential organs, as fundamental organs, can exist in the plant; namely, the axis and leaf. All the several parts of the flower must, therefore, be referable to these fundamental organs, and be traced back to them. Since Goethe's time, this tracing back has been termed the Metamorphosis of plants. Originally, this mode of considering the flower rested solely on comparative morphology, and the observation of cases in which the interruption of the usual processes of development, in some or all parts of the flower, caused those parts to reassume forms in which it was not difficult to recognise the nature of the fundamental organ from which they had been produced. This latter has been termed retrogressive metamorphosis; as examples of it, we may mention the different monstrosities, the doubling of a flower through the transition of the stamens into petals, the transition of the petals and sepals into the common leaves of the plant, &c. This mode of establishing the foundations of the doctrine of metamorphosis has, however, two essential faults: since, in the first place, it seeks to obtain individual facts by means of hypotheses and comparisons; while, secondly, its progress depends entirely upon favourable circumstances. The only correct and sure ground on which to rest this doctrine, is the history of development, and this, only quite recently recognised, is as yet pursued by few investigators; hence the doctrine, as a whole, still exhibits many deficiencies, imperfections, and uncertainties.

"The doctrine of the metamorphosis of plants is still partially treated as a special section of Botany, although it is in fact no other than an isolated fragmentary application of the *only really scientific principle* which botany can at present possess; namely, that of progressive development. By most persons, however, the matter was long, by some even still, regarded as an agreeable fantasy, playing round science. The blame of this rested partly upon the manner in which Metamorphosis was introduced into science.

"Even Linnæus had a presentiment of something of the kind, and in his Prolepsis Plantarum (Amœnit. Academ. vol. vi. p. 324) carried it out in such a way, that, starting from the consideration of a perennial plant with regular periodicity of vegetation (as in our forest trees), he explained the collective floral parts from the bracts onward, as the collective foliar products of a five-year-old shoot, which, by anticipation and modification, was developed in one year. This view is, in the first place, taken from the most limited point possible,—from the examination of a plant of our climate; and, secondly, imagined and carried out with great want of clearness. Up to the formation of the flower in the axil of the bract, the matter holds, perhaps; but from thence, the explanation is restricted to the laying down of his untenable, and, in the highest degree, superficial anatomical notions as to the connection of the floral parts with the elements of the stem; and only in a few very indefinite words is it indicated of every floral part, that it (for instance, the stamen) corresponds to the axillary bud of the preceding (the petal), and no attempt is made to elucidate how it happens that the axillary bud of the calyx appears only as *one* leaf (petal), and yet develops its axillary bud at one, which again is stunted to a single leaf; finally, the usual alternate position of the floral parts, directly contradicting the whole fiction, is not entered into at all.

"C. Fr. Wolff (Theoria Generationis, 1764) opened the true and only path by which this doctrine can be carried through, in making good the study of development as the true principle in Botany, as in other sciences. He erred, certainly, in particular conclusions; for instance, in determining the stamens to be modified axillary buds of the petals. But all his intelligent activity remained altogether lost to Botany, a fact readily explained by the scientific spirit of those days.

"Long after Wolff, Goethe wrote his 'Versuch, die Metamorphose der Pflanzen zu erklären,' (Gotha, 1790), in which he correctly explained most of the floral parts, up to the carpellary leaves, as foliar organs. With his method of mere comparisons and references to monstrosities, he could not, of course, pronounce anything original and profound as to the structure of the germen. Then he introduced, from Schelling's doctrines, the fantastic comparison with an alternating contraction and expansion, from which, in connection with a gradual refinement, proceeded the difference of the parts of the flower. This last was soon dropped. Goethe found little hearing at first in Botany, especially in Germany, where the very stupidest materialism of the Linnæan school prevailed; Jussieu and Usteri first mentioned his ideas in scientific Botany. But it was De Candolle (Organographie, Paris 1827) who first called general attention to this branch (or rather main trunk of Botany), and thus the so-called metamorphosis of plants gradually came to its place as a special chapter in the revision of the science. Wolff's ideas were not indicated by a single syllable, at most he was cited with philological profundity as Goethe's predecessor; and thus the whole doctrine, in the absence of the only correct method, remained without any essential influence for the advancement of Botany. As to the import of calyx, corolla, stamen, and carpel, as foliar organs all, except a few heretics, were soon agreed. The seed-buds (ovules) were left to originate as buds on the borders of the carpellary leaves, and no great trouble was taken about the thousand contradictions which lay close at hand. The particular families, more complicated in their structure, the pistils of which could not so readily be referred to carpellary leaves, &c., then became the tilting-ground for what were in part most adventurous fantasies and fictions. The unfortunate seed which Goethe sowed, sprang up with sad rapidity; and next to Schellingism, we owe it to him that, in Botany, whims of the imagination have taken the place of earnest and acute scientific investigation. In that unbounded region, every individual's imagination had naturally equal right; there was a total want of any scientific principle which should undertake the decision between differing opinions of any method, the recognised accuracy of which could give security for the results of an investigation.

"I have striven, in my methodological introduction, to develop such a principle for Botany, out of the contemplation of its object; and I here once more express my firm conviction, that without rigid carrying through of the investigation of development, in the total as in the singular, Botany is, and will remain, an unscientific game of purely arbitrary arrangement and combination of uncomprehended forms. In spite of our by far less difficult problem, Zoology has far outstripped us, and has shown us the road which properly she should have learned from us. We must follow behind, if every botanist does not in time become red with shame, who takes in hand a work of Müller, Schwann, Reichert, Baer, Rathke, Siebold, Wagner, and all the hundred others, by the side of whom we can scarce place half a dozen.

"Following Robert Brown, I first sought to apply the investigaof development to the discovery of the structure of flowers. In this manner I found the explanation of the flower of the Grasses, the Carices, the composition of the involucre in *Euphorbia*, &c. With my deceased friend Vogel, I published the first perfect history of development of the flower of a *Leguminosa*. After a considerable time some botanists followed me, and have in part confirmed the correctness of my views, The first was Geleznoff in *Tradescantia virginica* (Bull. de la Soc. Imp. des Nat. de Moscau, tom. xvi. 1843).

He was still doubtful whether the stamens did not arise earlier than the corolla. Duchartre spoke more decidedly on this point, with regard to *Malvaceæ* (Compte Rendu, 1844 Séance 18 Mars), and the *Primulaceæ* (ibid. Séance, 18 Juin.) On the other hand, Barnéoud confirmed my observations completely, through the investigation of the *Plantaginaceæ* and *Plumbaginaceæ* (Compte Rendu, 1844, 30 Juli). Strangely he says, that the course of development of the flower follows, against my theory (!), *from without inwards*, which, on account of the figures given by Vogel and myself, cannot be excused, even on the plea of ignorance of the German language.

"It has often been attempted to develope the morphological laws of the structure of flowers from monstrous formations. I believe that this attempt is altogether faulty, even presupposes a total ignorance of the value and import of the progressive development. If up to this point one must reject every application of the analogy of animals to plants, it were yet very desirable that most botanists should go through a thorough course of zoological physiology, so that they might, at least in some degree, learn method in the treatment of organic bodies. Whoever has traced the course of development of even a couple of only rather difficult flowers, will have certainly become convinced that every conclusion from the developed flower as to its regular rudiments, and the import of its parts, must inevitably be faulty, and that monstrosities, double and proliferous flowers, such as are transformed into leaves, &c., require elucidation by the history of development just as much as the normally formed flower itself. Even Mohl might have spared himself his so acutely carried out examination of *Poa vivipara*, and the explanation of the flower of Grasses deduced from it (Botan. Zeit. b. iii. p. 33), if he had only convinced himself, in the flower of a single Grass or of a single *Carex*, how by a subsequent one-sided development, the most perfect symmetry becomes wholly hidden. I have thought myself obliged, especially for a better understanding of the importance of the course of development, to care for it in publishing several of the more difficult or more instructive instances in the accompanying plates; namely, in Plate III., the course of development of the leaf of *Pisum sativum*, of the flower of *Agrostis alba* of *Carex Lagopodioides* and *Canna exigua*; and in Plates IV. and V. a more complete illustration of the development of the flower of *Passiflora princeps*."—Pp. 310–314.

The history of the various sorts of flowers is most extensive, and is explained by the author in great detail. It is highly elaborate, and may be recommended as giving a large amount of accurate information on the subject. This division is the most extensive of the whole; and while the third part, on Morphology, occupies the largest proportion of the volume, the subject of the Inflorescence embracing as it does the important subject of the history of fruits and seeds, forms the largest portion of the Morphology.

In the fourth part, the subject of Organology comes und consideration.

By Organology, the author understands the Consideration of t Plant in Life, or what is usually meant by Physiology of Plan Organology, he says, embraces the doctrine of true life of the who plant, and of its particular organs. Life he regards as the activ of those powers inherent in the matter, constituting the form (an the substance ?) of the plant, and which present themselves as t special life of the plant.

He then proceeds to consider the subject under the success heads of—A. the Life of the entire Plant; B. Germination and its Phenomena; C. Growth; D. the Process of Nutrition; E Reproduction of Plants; and F. Death of the Plant. The process of Nutrition is considered as subdivided into the five sever functions of—1. the Food of Plants; 2. Absorption of Food; 3. Assimilation of Food; 4. External Conditions of the Absorp- tion and Assimilation of Food; and, 5. The Motion of the Sa through Plants. These subjects are examined with great care an research. To one or two points only can we advert.

On the subject of Germination, it may be interesting to se some of the views and remarks of the author.

"In order to understand the subject of germination, we mus know the structure of the seed. We find that it contains the rudi- ments of the future plant, namely, a small body, having as essenti parts a radicle and a terminal bud. To these are added supplemen- tary organs, which are used at the end of the process of germinatio These supplementary organs are either the first leaves (cotyledon or the albumen. In these we trace three distinct relations, by means of which they subserve the purpose of retaining the activit of the embryo until the time comes for its development. The cells contain either less mucus but more starch, as in the legumi- nous cotyledons, and in the albumen of the *Cerealia*; or they con- tain more mucus and, instead of starch, a fat oil, as in the coty- ledons of the *Cruciferæ* and in the albumen of some Palms an *Euphorbiaceæ*; or, lastly, they contain scarcely any mucus, but thei walls are strikingly thickened, and the cellulose is found not to pos- sess its usual physical condition, or is in some way chemically dis- tinct. It is more easily dissolved and decomposed than usual. This is seen in some leguminous cotyledons, as, for example, in the Ta- marind, in the albumen of many Palms, as the Date-palm, and in a most striking degree in the Ivory-nut (*Phytelephas*). From th it results that we have six principal conditions, without mentionin the intermediate states, which demand an accurate investigatio Hitherto no microscopic and chemical history of germination has been given with any accuracy or completeness; we are still in th infancy of our knowledge respecting it. For the most part, chemis understand nothing of microscopic physiology, and botanists little of chemistry. Hence there has been no harmonious pursuit of science between them, the absence of which has retarded both.

that we neither possess, nor are on the eve of possessing, a complete and fundamental knowledge of the history of germination.

"The reason of our ignorance on this subject arises from the fact, that in investigating it the chief attention has been turned upon that point where the difficulty does not exist. The development of the young plant will be explained when we shall have explained the life of the plant in general. The principal difficulty that requires explanation is how the conditions, which in an embryo result in a definite process, remain for a long time suspended. If we place a ripe acorn in the soil, under all the circumstances requisite to germination, why do not those chemical processes which excite germination and development immediately take place? In this case chemical processes slowly go on in the interior of the cells, with which we are as yet altogether unacquainted; and perhaps, also, the structure of the cells, or the chemical nature of their contents, is such as to make the operation of external agencies only very slowly effective. The Coffee-bean does not germinate at all, unless it is placed in the requisite circumstances immediately upon its ripening. Wheat has been proved, by the experiments of Sternberg, to germinate after it had lain inactive for three thousand years. Many facts must be collected, and the most minute chemical investigations must be made respecting the contents of the cells and the cell-walls, the structure of the embryo must be accurately examined, before we can obtain correct results; all else is but theoretic dreaming. Only confusion or uncertainty can be expected where so much, if not all, is yet to be investigated.

"Thus much, however, we have ascertained teleologically, namely, that the cells of the embryo and the albumen are completely filled with assimilated matters, in order to prevent, during the drying of the cells, their crushing together, and thus to make their future active life possible. Of these matters a considerable portion is not only superfluous to the support of the life of the embryo, but is actually in the way, and when germination commences it is disposed of by being converted into carbonic acid and water. To this atmospheric oxygen is essential, and also, as in every other chemical process, a certain amount of heat and moisture; and these are the so-called conditions of germination. The measure of each which is necessary varies with the diffierent kinds of seeds, according to the chemical nature of the contents of the cells, of the cell-walls, and their general structure.

"Water plants germinate best in water,—land plants in damp earth. Of the precedents of this process we know nothing at all. We do not even know all the conditions under which starch is produced and decomposed; and those with which we are acquainted agree so little with those presented in the germinating plant, that they can serve little towards the explanation of the matter. The discovery of diastase by Payen and Persoz made a great noise, and it was generally thought that the key had been found; but it was forgotten that diastase only dissolves starch at a temperature of from 65°—70° C., and this temperature is not found to exist in germinating plants, and, should it be produced, it must destroy life. It is clear that only the decomposition of the carbonaceous substances is essential to the process of germination; all remaining phenomena belong solely to the processes of vegetation which appear later.

"A more important point occurs here, namely, the direction which the germinating plant takes. The examples of *Viscum* and *Loranthus* prove that it is not a universal law of vegetation that the root should grow downwards towards the centre of the earth, and that the stem should take a contrary direction. With the generality of plants this is indeed the ordinary manner of growth. However the seed may chance to fall, yet, in germination, the radicle so bends itself as to sink perpendicularly into the soil, whilst the stem rises perpendicularly from it. The direction which the stem takes is, however, much modified by the influence of light; it is found to grow in the direction from which the light comes: hence, if the light falls obliquely, the stem rises in a corresponding direction. Many theories have been invented to explain this, and supported by the very interesting experiments of Knight, gravitation has been called into aid; this only proves with what obscure notions some persons are satisfied. Whether the experiments of Knight would always give the same result, is very doubtful; but were it so, they would yet be very insufficient to establish that gravitation is the cause of this phenomenon, seeing that *Viscum* and *Loranthus* would not fall within the law; and the causes which determine the direction of the growth of these plants are probably the same as in others. Gravitation on the earth is in proportion to the mass and volume. These are sometimes greater in the radicle, sometimes in the upper part of the embryo; hence, according to the usual law of gravitation, the plant would sometimes grow in one way, sometimes in the other, which does not happen. Moreover, as the radicle lengthens, it draws fluids from the soil, and the contents of its cells are always more dilute and specifically lighter than those in the upper parts of the plant; hence it would turn the root round, which being attracted least to the earth, would ascend into the air. A cone falls to the earth upon its base; we have embryos of conical form, as well as of other forms, but both germinate so that the radicle sinks into the earth, though it may be projected from the point or base of the cone. No embryo germinates free, all remain for a longer or shorter time enclosed in the testa or pericarp, from which the embryo for some time only projects a small point; gravity must then act upon the pericarp, and thus determine the position of the embryo. In short, without consideration, an imprudent word has been thrust forward, and supposed to afford an explanation. I have already observed that no botanist is justified in saying absolutely and without reason how much or how little he will adopt of other systems for his own use, or as a point to start from. When he avails himself of other sciences, he must clearly comprehend the notions of these sciences, or he will but make himself ridiculous. But when, in the nineteenth century, a professor of physics can so err in fundamental principles as to say 'action from contact is improbable, because we know no example in which a body at rest can set another body in motion,' more at present can scarcely be demanded of botanists.

"It would be too much to assert the impossibility of gravitation being the cause of the phenomena above mentioned; but we have nothing to do with the power of gravitation, because we have no object on which it could act.

"The various fancies respecting the peculiar vessels which are employed in conveying the nutritive matter from the seed-leaves to the radicle, and all similar theories which are found in old works, I have left without notice, for they are altogether worthless. I will, however, enumerate some of the matters demanding examination, which will afford a more intimate knowledge of the process of germination.

"I. An explanation of the cause why, in the embryo and the albumen, the starch is dissolved, and the oil of fat is decomposed.

"II. An accurate determination of the degree of heat present during germination, and a comparison of the same with the quantities of carbon and hydrogen which are consumed.

"III. An exact quantitative analysis of germinating plants, and of their separate parts in all stages of germination; with an exact quantitative determination of the proportion of water taken up, and of gases interchanged, as well as in embryos containing starch as in those containing oil. It is evident that such analyses must be constantly pursued with the help of the microscope.

"IV. A repetition of the experiments made by Knight, with a view to ascertain whether the germination and continued growth might not be made in a direction the reverse of that which is usual, if earth should be placed upon them from above, whilst they should be subjected to strong light from below.

"The development of the spores of Cryptogamia, which is also termed germination, finds no analogy here but with the development of the pollen-grains in the embryo. In each of these, however, the physical and chemical conditions are different, and a special investigation of the process of development, with respect to the chemical and physical conditions of germinating ferns, is much to be desired; but there are many preliminary difficulties to be overcome. A close investigation of the kind pointed out in the third section above would tend to the explanation of many of the laws of vegetation, if it could be followed out with a number of the *Algæ*, for instance, *Spirogyra*, and in this case the natural position of the plant would greatly facilitate the investigation."—Pp. 461–464.

Next comes the important and difficult subject of the Nutrition of Plants. In this the author shows both great research and more originality of thought. He evidently throws considerable doubt upon the doctrine so much agitated of late years, of the soil being exhausted or deprived by successive crops, of its power of producing other crops. He maintains, at least, in pretty plain terms, that either the soil in itself possesses the means of recruiting itself after its annual efforts, or that its powers of contributing to the nutrition of plants are not exhausted in the manner in which chemists and agricultural speculators maintain that they are. He adduces numerous facts to show that either the application of manure is not necessary to the production of crops or, at all events, that excellent crops are produced, year after year, without the aid of manure. The best plan, however, is to submit to the reader the following observations, which contain so considerable a proportion of his views, that they may be regarded as presenting a fair specimen of his reasonings on this subject.

"It results, then, from these facts, that the organic substances which are burned and serve as food to animals, are at least half destroyed, and that in a hundred years they would be reduced to nothing. But we have, both in the history of the earth and in the history of man, in the former from geological period to period, and in the latter from century to century, evidence not of a decrease but of an increase of organic life upon the surface of the earth. There must, therefore, be continually going on a conversion of inorganic matter into organic combinations. From physiological researches it appears perfectly certain that this cannot go on in the bodies of animals. Neither do we know of any facts in the whole of nature that would lead us to conclude that inorganic substances independent of an organism could be changed into organic compounds; whilst, on the contrary, all experience proves that the organic substance is unceasingly passing over into inorganic combinations. The only inference from all this is, that plants convert inorganic into organic substances; and this we must hold as a first great law of nature. The only universally diffused inorganic compounds which can be taken up by plants in order to assimilate carbon, oxygen, hydrogen, and nitrogen. are the carbonic acid gas, water, and carbonate of ammonia of the atmosphere, and from these must the vegetable world be almost exclusively supplied as the materials of their nutrition. This law concerns not alone the vegetable world in general, but has an important special application in the culture of plants. This will be seen when we look at the production of manure according to the foregoing calculations; and further, reflect that on a well-managed estate a considerable part of the produce, as corn, cheese, butter, wool, &c., is annually taken away, returning no manure to the soil, and that the organic substance remaining on the estate must be reduced as food by at least one half. Boussingault places the yearly account of dry organic products contained in the manure in contrast with the products obtained from the soil, during a period of twenty-one years, and finds the proportions are as 33 to 124, so that it would be constantly necessary to replace three-fourths of the humus present, and thus every soil within a short time must be perfectly exhausted of organic matters. According to Sir H. Davy,—

	Organic Matters and Salts.
Good soil for the growth of Hops contains .	8·0 per cent.
Good soil for Turnips . . .	0·6
Very good soil for Wheat . . .	4·4
Extraordinarily fruitful soil . . .	2·8
Good soil	1·4
Excellent Wheat soil . . .	12·7

"It is thus very clear that the fruitfulness of the soil does not stand in any relation to its contents of organic substances, but that it appears to depend, on the contrary, on the nature of the plants cultivated and the tillage of the soil.

"But we are enabled to take quite a different view of the culture of plants, if we do not confine ourselves to the little spot of earth from which our profound agricultural manuals are supplied with material. Loudon gives a view of the kinds of agriculture according to the following scheme:—

"1. Agriculture with exclusive irrigation, extending to 35° on each side of the equator.

"2. Agriculture with irrigation and manuring, extending from 36° to 45° N. and S. lat.

"3. Agriculture with draining and manuring, from 45° to 67° lat.

"As the last zone alone embraces any considerable surface of the earth in the northern hemisphere, and as local circumstances, both in the second and third, according to the nature of the plant, determine the use of manure or irrigation, it may be advanced, without fear of contradiction, that generally three-fourths of the agriculture of the surface of the earth is carried on without the aid of organic manures, and that the produce in such districts is much greater than where it is carried on in unfavourable regions by the aid of manures. Unfortunately, travellers have given us much too little information of the various ways in which agriculture is carried on in different lands. As plants that are cultivated without manure, we may name the Maize, Rice, Sugar-cane, Plantain, Banana, Manioc, Yams, Coffee, &c.; as regions in which no organic manures are employed, and in which irrigation alone is employed in the culture of plants, we may mention Central Russia, in Spain the district of Malaga, Arabia, Hindostan, Binnan, Java, Ceylon, Malacca, Siam, Cochin China, Tonquin, a part of Japan and China, Van Diemen's Land, a part of New Holland, Polynesia, Abyssinia, Egypt, Morocco, Cape of Good Hope, Madagascar, Madeira, Chili, Mexico, the Brazils, a part of Canada and of North America. In a word, the way in which the experience of agriculture has been employed for a theory of the nutrition of plants, reminds one very much of the contracted horizon of a small town, Philistine.

"In accordance with these views, then, we maintain the right to reject, without inquiry, every theory of vegetable nutrition which does not put forward the same as its basis, and especially all theories which set forth organic materials as a *principal* source of nourishment for plants.

"Although the leading propositions, through the above development, may appear to be perfectly firmly established, yet we ought not to disdain any individual fact that would confirm or extend the basis. To this end the observation of smaller parts of the earth's surface may serve, which we may in some measure regard as a separated whole.

"The Pampas of Buenos Ayres, at the time of its discovery by the Spaniards, exhibited the same character as it does at the present day. Endless plains, with mostly a poor, though, in the low-ground, a cheerful growth of grass, interrupted by paths, and here and there hedged in with stripes of Algarobias and Acacias, present themselves, and besides the grave Bizcacho, the Turuturu, and similar small animals, are seen Ostriches, herds of Guanacos, and a scarce population of men. All these remain; but the Spaniards brought with them between 1530 and 1532 horses and horned cattle, which, getting wild, have increased in such immense numbers, that, during the war of General Rosas with the Indians, 20,000 horses were often lost in a few days. They wander about in countless herds, numbering about 15,000 in each, so that horses and cattle have but little value. The European has extended himself over these districts, and has introduced in the neighbourhood of the great cities a more luxurious vegetation, and the artichoke and the thistle occupy large portions of land. The organic substance in these regions, so far from decreasing, has apparently greatly increased. At the same time, the land, without receiving any remarkable contribution of organic matter since that time, has yielded, in constantly increasing proportions, immense quantities of organic substances. The hides alone would represent an annual loss of 60,000,000 lbs. of organic substance. But this is only an inconsiderable part. According to their products, these herds cannot be estimated at much less than 20,000,000, and in a single year they would destroy by the process of nutrition, 80,000,000,000 lbs. of organic matter, or in 100 years 8,000,000,000,000 lbs. All this organic substance must come from plants; and who could advocate the senseless position, that all these substances were once humus or some other organic matter stuck in the barren soil of the Pampas?

"A great part of Central Russia is covered with a soil, which, on account of its colour, is called by the Russians *Tschornoisem*, black earth, and is distinguished for its extraordinary fruitfulness. The rural economy in this district is about the roughest in the world; manuring is never once thought of; and those crops alone are sown which momentarily promise the greatest return for the least amount of labour. Berzelius has given an analysis of this soil by Herrmann, according to whom a more useful soil does not exist.

Crenic acid Apocrenic acid Humic acid	combined with iron and alumina	= 5·66 per cent
Humus extract	. . . . .	= 3·10
Humin and roots	. . . . .	= 1.66
		10·42

"Let us suppose this would yield 6 per cent. of organic substance, which is the outside of the fact. The old Hessian acre (Morgen) (40,000 □ F.) bears, according to Block, at least 1710 lbs. of straw and 500 lbs. of grain. I will put it down at only 1076 lbs. of organic substance for the two. The depth of soil may be taken at 12 inches, the cubic foot 2·0 P. sp.; thus each Morgen, through cultivation, would yield 57,600 lbs., which, according to the above calculation, would suffice for a culture of 500 years. But mould, according to Saussure, losses, through putrefaction, at least 5 per cent; so that, according to the above calculation of its quantity (6 per cent.), in the first year it would lose 14,400 lbs., so that the 57,600 lbs. would not supply 10 years' consumption. This analysis of Herrmann must be allowed to be very bad. With the clay he finds no trace of alkali, although the soil had grown wheat for centuries, and no phosphoric acid, except 0.46 per cent. of phosphate of iron and alumina. A better analysis of this highly interesting soil is wanted. That these calculations, however, may on the whole be relied on, is proved by other cases. The arable land of the Saalaue at Jena contains nearly one per cent. of humic acid combined with ammonia, and is a very beautiful wheat soil. The specific gravity is 2·59, so that the top soil, 12″ deep, of a single old Hessian Morgen of 40,000 □′ weighs 6,800,000 lbs., and consequently contains about 68,000 lbs. of humus. According to Boussingault, a soil in an average state of culture delivers 1050 lbs. per Morgen more organic matters than it receives through manures, so that these fields must be exhausted in 70 years, and, if the putrefaction is reckoned, in 25 years. But this arable land has been formed within the last century by the breaking up of meadow land, some of which still remains, and remarkable for its growth of grass; the average of six analyses of this meadow land gives 0·49 per cent. of humus, or about half of that of the arable land.

"One of the most striking facts demanding an explanation of the defenders of the organic theory of vegetable nutrition, is the agriculture of the Alps. No one thinks of manuring these alpine pastures; countless herds are nourished in the summer upon its grass and herbs, and return at the utmost in their excrements but half of the organic substances they take up. Large quantities of cheese are annually conveyed away from these pastures, with no return but thanks; hay is also taken from them and converted into dollars. This system has been carried on in the Alps for centuries, in some places for a thousand years, and yet no one has observed any deficiency in the fruitfulness of these regions. Can any one be so foolish as to maintain that the thin covering of soil which often lies upon the naked rocks is so rich in organic substances as to furnish this constant loss without exhibiting any remarkable change?

"Lastly, we can make a calculation for the cultivation of land for an indefinite period. According to Boussingault, a Morgen of well-cultivated soil on an average yields 2480 lbs. of dry organic substance, and receives in manure only 795 lbs., or not more than a third part. Every well-cultivated soil, instead of being the poorer in humus from the loss of organic substance and the attendant putrefaction, is the richer. It is not, however, necessary to refer to the investigation of Boussingault, as any one may be convinced of the absurdity of the humus-theorists by examining their own data for regarding the organic constituents of plants as a principal source of their nourishment.

"Boussingault has performed an interesting experiment on a small scale. He sowed 1·072 mgr. of peas in a mixture of burnt clay and sand, and watered it with distilled water; the ripe plants yielded 4·441 mgr., thus making 4·14 times as much as was sown. According to Block, when 138 lbs. are sown on an acre, in the third year of the manuring 880 lbs. are harvested. In burnt clay or sand the harvest would have been 571·32 lbs., according to the result of the experiment by Boussingault, the difference showing how much organic substance is necessary for the healthy development of the peas. The same experiment has been tried on a large scale, with far more splendid results, for many centuries in Cuba, and for sixty years in France. The *Tierra colorada*, in the higher regions of the island of Cuba, produce from year to year the richest harvests of Coffee and Indigo. This soil is never manured, and is a pure clay, which in other places would be called an iron soil. A very accurate analysis of this earth in the Laboratory of the Agricultural Institute of Jena, by Herr Wapler, gave the following results:—

"The earth is very fine, and contains only a small quantity of insoluble quartz, and small bits of chalk or limestone. It is soft to the feel, and of a dark brown colour.

" *A*. Soluble in Hydrochloric acid			24·0
	Oxyde of iron	12·20	
	Alumina	6·00	
	Carbonate of lime	5·80	
	Magnesia	traces	
		24·00	
" *B*. Insoluble in Hydrochloric acid			75·4
	a. Humic acid, soluble in ammonia	traces	
	b. In sulphuric acid, soluble in potassa	1·41	
	Alumina, with traces of oxide of iron	34·34	
	Magnesia	0·71	
	c. Silica	38·94	
		75·4	
" *C*. Loss			0·6
			100·00

"In France the following experiments have been made between the mouths of the Gironde and the Adour. The sand-downs which are washed from the sea are carried by the west wind into the interior, and thus large districts of the land are converted into a kind of

Sahara. After many purposeless attempts to arrest the movement of this sand, by planting wood, the sound plan was hit upon in the year 1789, of planting these sand-hills with coniferous trees. This perfectly succeeded, and in the year 1809 there were already 15,000 Hessian acres converted into a pine forest, which had grown upon the driest possible soil, and which was entirely destitute of organic substance. The same phenomenon is seen in the pine forests of the Mark and in the oases of the Sahara. In most cases, where the inorganic elements of the soil are suitable, and water is found in sufficient quantities, vegetation is possible upon the surface of the earth.

"Lastly, I will refer to a point which unfortunately I cannot illustrate with figures, as no accurate data exist. Our economical arrangements generally, and the way in which rain water is necessarily got rid of from our cultivated soils, and carries with it into brooks and streams their soluble constituents, make it certain that all our rivers carry annually to the sea a large quantity of organic substance from the land. If we were to calculate this loss for the more considerable rivers, according to the quantity of organic matter their waters presented on chemical analysis, it would probably greatly exceed all our conceptions. As instances, I would refer not merely to the organic substances, but to the entire plants and animals, which are annually brought down to the sea by the two great rivers of America, the Amazons and the Mississippi.

"In short, regard this matter as we will, the theory which would derive the food of plants from the organic substance of the soil is a remarkable example of the perversities to which a hypothetical natural history may lead without fundamental principles. To show how thoughtlessly the humus-theorists have gone to work, a single example will serve. According to Sprengel, plants derive the principal part of their carbon from humic acid. This they take up as humate of lime, and the advantage of lime to the soil is supposed to lie in its forming this salt with humic acid. It contains, according to Sprengel, 1 lb. of lime, and 10·9 lbs. of humic acid. But the produce of wheat on an acre (after four years' manuring, according to Block) in straw and grain would be 1071·24 lbs. of carbon, which would require 1552·52 lbs. of humic acid, which would require 142·43 lbs. of lime to convert it into humate of lime. But this wheat contains, at the highest, in the grain, 0·527 lbs., and in the straw, 8·873 lbs. of lime, which is about $\frac{1}{15}$th of what it ought to contain. And if we take, for example, the clover, which, for this view, is the most advantageous of plants, we shall find the result the same. According to Block, an acre of clover contains 1020·73 lbs. of carbon, which is equal to 1479·32 lbs. of humic acid, which would require 135·7 lbs. of lime in the plant, whilst in reality the clover contains only 40·29 lbs., or about one-third the quantity."—Pp. 475–480.

Dr Schleiden, it appears, in these passages, rejects in a great measure, if not entirely, the idea that the organic substances, and the remains of organic substances, found in manure, and similar articles applied to the soil, are at all necessary in order to enable plants to grow and thrive.

He then divides the organic substance of vegetables, so far as their nourishment is concerned, into two orders, one containing no nitrogen, and the other containing this element. The first he arranges in three divisions; one, in which, together with carbon, hydrogen, and oxygen, so united as to form water, contribute to the production of dextrine, gum, starch, sugar, and similar substances; a second, in which oxygen is present in amount so considerable as to form vegetable acids; and a third, in which it is found in very small proportions, or is wholly absent, and consequently only compounds of carbon and hydrogen are formed, namely, the oils. The second order, the nitrogenous, or protein compounds contain along with the four elements, sulphur and phosphorus.

He then enters on a lengthened but interesting discussion, to show whence these different elements are derived, with the view of affording what he calls special proof, that the individual elements are taken up in the inorganic, not the organic form; and also specifying the essential sources of these combinations. This discussion, however, is chiefly confined to illustrate the question as to the sources of Carbon and Nitrogen.

One of the most remarkable, and, on the whole, interesting points, is that relating to the early production of coal from the primeval earth. Dr Schleiden justly observes, that it is difficult to believe, that the mountains and other parts of the dry land, when the sea ceased to cover them, could be thickly covered with mould. It is much more likely that they were entirely naked, and that they were only gradually covered with mould by means of vegetation. Upon this earth, nevertheless, thus void of mould, arose that exuberant vegetation which after long ages must have formed the coal formation, the immense extent of which, at the present day, in many countries, must fill the mind with amazement and wonder. Conceive all the palms, ferns, pines, and other timber which furnished these immense depots of coal, on which are still seen the vegetable impressions, and in which can still be traced the vegetable structure, growing on soils in which there could have been little, or rather no carbon, yet these plants furnishing carbon and bitumen profusely.

Here is another fact of the same kind. The palm-trees, which furnish palm-oil (*Cocos nucifera* and *Elais guineensis*), grow on sea sand. The latter is largely cultivated on the west coast of Africa, in moist sand, unenriched by manure. Between the years 1821 and 1830, England alone imported from the coast of Guinea, 107,118,000 pounds of palm-oil, and consequently about 76 million pounds of carbon, all drawn from a soil containing no carbon. At present the yearly import is about 33 million pounds of oil; so that the sandy soil upon which these palms grow, must, in order to supply the yearly export of oil, furnish about 25 million pounds of carbonaceous matter.

In these and all similar instances,—and many may be adduced—the carbon cannot come from the elements of the soil. The conclusion must be that the chief source is the carbonic acid which the vegetables must have the power of decomposing.

Nitrogen is next considered, and forms the subject of some interesting observations. For these, however, we must refer to the work itself. We have only to say, that it appears not extremely difficult to account for nitrogenous compounds, when it is remembered that about two-thirds of the atmosphere is nitrogen, and which consequently plants may equally have the power of abstracting and applying, to form, with carbon, albuminous or proteine compounds.

The residue of this part on Organology contains a large amount of instructive information communicated in an interesting manner.

These two works are, in all respects, the best that we have seen on the subject of Botany, considered in a scientific and philosophical manner. Both must be allowed to mark a new era in the science. In both are seen the same careful selection of facts, the same diligent distinction between facts and hypotheses, and the same desire to present what may be termed a correct view of the present state of botanical information. This is peculiarly the case as to the anatomy and the physiology of plants, and above all, to what may be called the importance of the vegetable world in the phenomena of Nature.

After saying thus much of the two works, it may be expected that we say something of the distinctive merits of each. The treatise of Mr Henfrey is short but explicit, and may be recommended as a sort of compendious work on the same principles as the treatise of Dr Schleiden. This latter work is more ample, elaborate, and extensive in all its details. It is so written, nevertheless, that the reader may or not enter into very detailed study of the subject. The principal and essential facts are delivered in a series of two hundred and twenty-four aphoristic paragraphs which are understood to constitute what may be called the general and indispensable propositions, of which at present the science of Botany consists. These are illustrated, proved, and corroborated by commentaries more detailed, and containing the specific facts upon which the truth of the general propositions is made to rest. In the course of these commentaries, also, the author is careful in distinguishing all doubtful points, and mentioning them as requiring more ample and accurate investigation. These commentaries constitute at least four-fifths of the work; and though, without these, the work would be most incomplete and difficult to understand, yet the general propositions form the main points to which the student's attention should be directed.

One feature of the work is remarkable. In perusing it, the impression left on the mind of the readers, that all botany hitherto taught has been worse than useless, in so far as it has consisted an immense and confused mass of badly determined facts, fictiti representations, rash inferences, and unfounded hypothese. Every botanist and vegetable anatomist and physiologist ha been in error, and has substituted for science his own fancies, a speculations thereon founded. None has observed carefully, none has reasoned correctly. The only exceptions, and we ar happy to perceive the first is Robert Brown, Fries, Fritsch, th instructor of Dr Schleiden, Hugo Von Mohl, Naegeli, and no and then Achille Richard. But Link, Decandolle, and scores o other great names, all fall under the general and sweeping condemnation of the author. Scarcely any one suffers so frequentl as Liebig, who, though his merit is in various points admitted is nevertheless repeatedly stated to have drawn unfounded conclusions, and to have evinced great ignorance. On this part o the work, we think it unnecessary to give any opinion. But we wish that the errors had been rectified in a more dignified manner, and with less mention of those who are chargeable with them.

It is impossible to doubt that the present work is calculated t effect a beneficial change upon the science of Botany, and the methods of studying it. If the precepts of Dr Schleiden be faithfully adopted, and his example be followed, a most favourab change for the better ought to be the result. Facts, however small in number, will then be truly facts, and not the offspring of the fancy and delusions of the observer. Distinctions will be carefully drawn between matters of fact, which can be recognised by all and matters of opinion, in which only few persons participate. Above all, correct interpretations will be put upon those questionable and uncertain phenomena, mostly microscopical, which are so incessantly leading astray the vegetable physiologist and the hasty observer. Herbariums will no longer be regarded as proofs of botanical knowledge, and will be viewed as memorials of the diligence only of their collectors.

In the Appendix are given a series of serviceable tables, illustrating various points treated in the work; some addenda and rectifications which appeared in the third German edition of the treatise; and an interesting memoir on the use of the microscope, and the errors to which its abuse and misapplication are likely to lead. The author is unjustly severe upon English artists, and microscopes made by them; and we are pleased to observe that the translator has studied to refute the charges brought against English-made microscopes. The truth is, that many excellent microscopes are made by the London instrument-makers, instruments, we believe, as good as the optical, and better in the mechanical construction than those made by foreign artists. The only objection is, that the London instrumemts are a little more

expensive than the foreign ones; but they are invariably better finished. The matter, however, may be left in the hands of Mr Lankester, and such artists as Mr Pritchard, Mr Ross, and Mr Powell.

ART. II.—*Observations on Trance, or Human Hybernation* By JAMES BRAID, M. R. C. S., Edinburgh, C. M. W. S., &c. &c. London and Edinburgh, 1850. Pp. 72.

NEAR the close of an Article on Mesmerism as a Therapeutic Agent, in the Sixty-Third Volume of this Journal, is the following passage.

"Then what is magnetic sleep? it may be asked. From what has fallen under our own observation in this matter, we infer that it is a state of the nervous system peculiar to hysterical persons, allied probably to catalepsy or hysterical stupor. This, however, it is not at all necessary to explain. The fact of magnetic sleep being induced in certain persons, by certain processes operating on the nervous system, we admit chiefly as a phenomenon in the operations of the imagination, and that mixed state which results from the influence of the nervous system on the corporeal organs. It is evidently not natural sleep, neither is it a natural state. But it is a morbid condition of the system as much as catalepsy, trance, or the hysterical syncope, or somnambulism."*

Upon this passage, which was written upwards of five years ago, Mr Braid has, without apparently being aware of it, published a very ingenious commentary. Some four years ago, Mr Braid published a very ingenious treatise on what he denominates Hypnotism, that is, a state of induced sleep, different from natural sleep. Mr Braid rejects altogether the doctrine of what is called Animal Magnetism and Mesmerism; but he admits the facts such as they are observed to take place, and these he refers to the state to which he gives the name of Hypnotism, or Nervous Sleep, by which he understands a peculiar condition of the nervous system, into which it may be thrown by artificial contrivance, and which differs in several respects from common sleep, or the waking condition.

Since the publication of that essay, Mr Braid has been considering all those facts and classes of facts which might illustrate the doctrines therein proposed. Among other facts, his attention was naturally called to the practice occasionally followed by the Faquirs in India, of allowing themselves to be buried alive for a certain period,—nine or ten days, one month, six weeks, or longer.

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* Edinburgh Med. and Surgical Journal, Vol. lxiii. p. 495. Edinburgh, 1845.

As, upon careful inquiry into several instances of this species of voluntary sepulture and exclusion from air, Mr Braid conceives the evidence was satisfactory, that these persons really were for a time in the state of persons buried, and of apparent death, and that the circumstances precluded collusion; the next step, admitting the facts to be as stated, was to ascertain what was the explanation. Mr Braid thinks that this is to be found in the circumstance, that these persons, namely, the Faquirs, have a method of putting themselves into a condition like trance, if not the same as that state, and similar to the hybernation of the hamster, marmot, and other animals.

Some of the facts which Mr Braid had thus obtained, he intended to have published in a new edition of the Essay on Hypnotism. But as the publication of that work is unavoidably deferred for some time, he thinks that it is desirable to publish them at present in a separate form, as they may be interesting to various classes of readers. The author has made the whole of his facts and reasonings available in illustrating the condition to which he applies the name of Hypnotism, as well as to that modification of the system which has been by nosologists described under the names of Catalepsy and Trance.

Mr Braid begins the present essay by directing attention to the well-known and often-quoted case of Colonel Townsend, as recorded by Dr George Cheyne. Mr Braid has fallen, as to the authorship of this case, into a small, though a very strange, mistake, for which we are unable to account, and which it is necessary to rectify, before proceeding further. He represents it as recorded by the late Dr Cheyne of Dublin, whom he justly mentions as a practical physician, possessed of high talents and scientific attainments, and a person of elevated character, as a Christian and a gentleman. Of these facts no one doubts, who knew and remembered the late John Cheyne of Dublin. It is not this excellent person, however, to whom the profession, otherwise deeply indebted, are obliged for the record of the case of the Honourable Colonel Townsend. The individual who witnessed and recorded the facts of the case of Colonel Townsend, was George Cheyne, a Scottish physician also, who flourished one hundred and thirty years ago, first at London, afterwards at Bath, who wrote many books, and who was one of the ablest of the hiatro-mathematical physicians. A singular character, certainly, was George Cheyne, and a man also, like his more recent countryman, of very decided religious principles, but by no means possessing the mental energy or the amiable and interesting character of John Cheyne. George Cheyne was a man of great learning, the pupil of Pitcairn and friend of Arbuthnot and Mead, writes several interesting books, and in one of them, entitled the English Malady, gives a sort of autobiographical sketch of his own life; and a strange life it appears to have been, though pregnant with instruction. But with this at present it is not our intention to meddle. All that relates to the present question is to state that, in the third part of the same work, is given the case of Colonel Townsend, as it occurred in the city of Bath, under the eyes of his two physicians, Dr Baynard, the author of the work on hot and cold water Baths, and Dr George Cheyne, and Mr Skerine, the apothecary or ordinary medical attendant. The exact date at which this occurrence of alleged spontaneous dying took place is not specified by the author; but it must have been immediately previous to 1734, when the second edition of the English Malady appeared.

Colonel Townsend, it may be proper to mention, had been long an invalid, with symptoms indicating the presence of disorder of the kidneys. He had been reduced, by frequent vomitings, as well as pain, to a state of extreme weakness, and in this state he was conveyed in a litter from Bristol to Bath, in order to have the benefit of the advice of the physicians of that city.

There, though under the care of Dr Baynard and Dr Cheyne, the vomitings continued for eight days, so incessantly and obstinately, notwithstanding all remedies, that these gentlemen despaired of his recovery. In this state of extreme exhaustion, the patient sent for his attendants and informed them, that he had for some time felt in himself a singular sensation, which was, that, composing himself, he could die or expire when he pleased, and yet, by an effort, or somehow, he could again come to life. This, it seems, says Dr Cheyne, he had sometimes tried, before he had sent for us. It was at this time, and under these circumstances, that he insisted on making the experiment before these gentlemen, in order to obviate all incredulity.*

It has never been well agreed among physiologists what was the exact state in which Colonel Townsend was, when he undertook to die, and when he was in the state called dying or dead. He never did it more than once; for the second time, according to the account of George Cheyne, he did really die, and never again came to life. It has been commonly supposed and said, that he possessed the power of suspending and stopping respiration, and thereby arresting the action of the heart. If he did possess this power, it is more than probable that he did not possess the faculty of re-establishing the movements of respiration; as it is known that, in the only attempt that he made, after half an hour of lifeless immobility, the eye-witnesses observed some motion about his body, and upon examination, found his pulse, and the motion of his heart, gradually returning; and then they observed that he began to breathe heavily, and speak softly. In this instance, then, it appears, that if respiration were really suspended during the state of Asphyxia, the motion of the heart had returned before respiration was re-established.

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* The English Malady; or a Treatise of Nervous Diseases of all kinds. In three Parts. By George Cheyne, M.D., Fellow of the College of Physicians, Edinburgh, and F.R.S. The Second Edition, London, 1734, 8vo., George Cheyne was admitted Fellow of the College of Physicians in Edinburgh, in May 1721.

The sequel of the case, however, which is not given by Mr Braid, deserves attention, as illustrating the peculiar nature of it. "Colonel Townsend," it is stated, "after the symptoms of revival now mentioned, afterwards called for his attorney, added a codicil to his will, settled legacies on his servants, received the sacrament, and calmly and composedly expired about five or six o'clock the same evening."

The body was examined the following day, agreeably to the orders of the deceased.

The lungs were fair, large, and sound. The heart was big and strong. (The words of the reporter.) The intestines sweet and clear. The stomach was of due proportion; the coats sound and thick; and the villous membrane quite entire.

The left kidney was natural in size and structure. The right was enlarged to four times the usual size, distended like a membranous sac; and yielding as if full of semifluid pap. It was quite filled with white chalky matter like plaster of Paris, and the whole substance of the parenchymatous gland was dissolved and worn away.*

This Dr Cheyne regarded as the source of all the misery of the patient; and the symptomatic vomitings, he adds, from irritation on the consentient nerves, had quite starved and worn him down.†

These facts we feel it necessary to mention, because we think it right that readers should judge, whether it be possible to draw from them the conclusions which are often deduced from this almost solitary case. It is clear that, if Colonel Townsend possessed the faculty of suspending at will respiration, and thereby stopping the movement of the heart, he had not the faculty of equally restoring the movements of respiration. Is it not probable that the first act of apparent dying was a sort of syncope or long swoon in a person previously reduced to great weakness, partly by inanition, partly by the wearing down effects of long continued disease? May it not become a question how far the phenomena of such a case are similar to those of trance or even of hybernation, and whether they admit of comparison with the facts now to be related? Whether these questions are entitled to consideration or not in the present inquiry, the reader may judge, after he has perused the following account.

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* English Malady, p. 310. Part III., containing cases.

† Ibidem.

1. The first statement is from Sir Claude Wade, political agent at the court of Runjeet Singh at Lahore.

"I was present at the Court of Runjeet Singh when the Fakeer mentioned by the Honourable Captain Osborne was buried alive for six weeks; and, although I arrived a few hours after his actual interment, and did not, consequently, witness that part of the phenomenon, I had the testimony of Runjeet Singh himself, and others the most credible witnesses of his Court, to the truth of the Fakeer having been so buried before them; and, from my having myself been present when he was disinterred, and restored to a state of perfect vitality, in a position so close to him as to render any deception impossible, it is my firm belief that there was no collusion in producing the extraordinary fact which I have related. Captain Osborne's book is not at present before me, that I might refer to such parts of his account as devolve the authenticity of the fact on my authority. I will, therefore, briefly state what I saw, to enable others to judge of the weight due to my evidence, and whether any proofs of collusion can, in their opinion, be detected.

"On the approach of the appointed time, according to invitation, I accompanied Runjeet Singh to the spot where the Fakeer had been buried. It was in a square building, called a *barra durra,* in the middle of one of the gardens, adjoining the palace at Lahore, with an open verandah all round, having an enclosed room in the centre. On arriving there, Runjeet Singh, who was attended on the occasion by the whole of his Court, dismounting from his elephant, asked me to join him in examining the building to satisfy himself that it was closed as he had left it. We did so; there had been a door on each of the four sides of the room, three of which were perfectly closed with brick and mortar, the fourth had a strong door, which was also closed with mud up to the padlock, which was sealed with the private seal of Runjeet Singh in his own presence, when the Fakeer was interred. Indeed, the exterior of the building presented no aperture by which air could be admitted, or any communication held by which food could be conveyed to the Fakeer. I may also add, that the walls closing the doorway bore no mark whatever of having been recently disturbed or removed.

"Runjeet Singh recognised the seal as the one which he had affixed, and as he was as sceptical as any European could be of the success of such an enterprise,—to guard as far as possible against any collusion,—he had placed two companies from his own personal escort near the building, from which four sentries were furnished and relieved every two hours, night and day, to guard the building from intrusion. At the same time, he ordered one of the principal officers of his court to visit the place occasionally, and to report the result of his inspection to him, while he himself, or his minister, kept the seal which closed the hole of the padlock, and the latter received the report, morning and evening, from the officer on guard.

"After our examination we seated ourselves in the verandah opposite the door, while some of Runjeet Singh's people dug away the mud wall, and one of his officers broke the seal and opened the padlock. When the door was thrown open, nothing but a dark room was to be seen. Runjeet Singh and myself then entered it in company with the servant of the Fakeer; and a light being brought, we descended about three feet below the floor of the room into a sort of cell, where a wooden box, about four feet long by three broad, with a sloping roof, containing the Fakeer, was placed upright, the door of which had also a padlock and seal similar to that on the outside. On opening it we saw a figure enclosed in a bag of white linen, fastened by a string over the head—on the exposure of which a grand salute was fired, and the surrounding multitude came crowding to the door to see the spectacle. After they had gratified their curiosity, the Fakeer's servant, putting his arms into the box, took the figure out, and closing the door, placed it with its back against it, exactly as the Fakeer had been squatted (like a Hindoo idol) in the box itself.

"Runjeet Singh and myself then descended into the cell, which was so small, that we were only able to sit on the ground in front of the body, and so close to it as to touch it with our hands and knees.

"The servant then began pouring warm water over the figure; but, as my object was to see if any fraudulent practices could be detected, I proposed to Runjeet Singh to tear open the bag, and have a perfect view of the body before any means of resuscitation were employed. I accordingly did so; and may here remark, that the bag, when first seen by us, looked mildewed, as if it had been buried some time. The legs and arms of the body were shrivelled and stiff, the face full, the head reclining on the shoulder like that of a corpse. I then called to the medical gentleman who was attending me to come down and inspect the body, which he did, but could discover no pulsation in the heart, the temples, or the arm. There was, however, a heat about the region of the brain, which no other part of the body exhibited.

"The servant then recommended bathing him with hot water, and gradually relaxing his arms and legs from the rigid state in which they were contracted, Runjeet Singh taking his right and I his left leg, to aid by friction in restoring them to their proper action; during which time the servant placed a hot wheaten cake, about an inch thick, on the top of the head,—a process which he twice or thrice renewed. He then pulled out of his nostrils and ears the wax and cotton with which they were stopped; and after great exertion opened his mouth by inserting the point of a knife between his teeth, and, while holding his jaws open with his left hand, drew the tongue forward with his right,—in the course of which the tongue flew back several times to its curved position upwards, in which it had originally been, so as to close the gullet.

"He then rubbed his eyelids with ghee (or clarified butter) for some seconds, until he succeeded in opening them, when the eyes appeared quite motionless and glazed. After the cake had been applied for the third time to the top of the head, the body was violently convulsed, the nostrils became inflated, when respiration ensued, and the limbs began to assume a natural fulness; but the pulsation was still faintly perceptible. The servant then put some of the ghee on his tongue, and made him swallow it. A few minutes afterwards, the eyeballs became dilated, and recovered their natural colour, when the Fakeer, recognising Runjeet Singh sitting close to him, articulated in a low, sepulchral tone, scarcely audible, 'Do you believe me now?' Runjeet Singh replied in the affirmative, and invested the Fakeer with a pearl necklace and superb pair of gold bracelets, and pieces of silk and muslin, and shawls, forming what is called a khelat; such as is usually conferred by the princes of India on persons of distinction.

"From the time of the box being opened, to the recovery of the voice, not more than half an hour could have elapsed; and in another half-hour the Fakeer talked with myself and those about him freely, though feebly, like a sick person; and we then left him, convinced that there had been no fraud or collusion in the exhibition we had witnessed.*

"I was present, also, when the Fakeer was summoned by Runjeet Singh from a considerable distance to Lahore, some months afterwards, again to bury himself alive before Captain Osborne and the officers of the late Sir William M'Naghton's mission in 1838; which, after the usual preparation, he offered to do for a few days, the term of Sir William's mission being nearly expired; but from the tenor of the doubts expressed, and some observations made by Captain Osborne as to keeping the key of the room in which he was to be buried in his own possession, the Fakeer, with the superstitious dread of an Indian, became evidently alarmed, and apprehensive that if once within Captain Osborne's power, he would not be allowed to escape. His refusal on that occasion will naturally induce a suspicion of the truth of the transaction which I witnessed; but to those well acquainted with the character of the natives of India, it will not be surprising that, where life and death were concerned, the Fakeer should have manifested a distrust of what to him appeared the mysterious intentions of a European who was a perfect stranger to him, while he was ready to repose implicit confidence in Runjeet Singh and others before whom he had exhibited. I am satisfied that he refused only from the cause I have mentioned, and that he would have done for me what he declined doing for Captain Osborne.

"It had previously been observed, also, by Sir William M'Naghton and others of the party, truly, though jestingly, that if the Fakeer should not survive the trial to which he was required to submit, those who might instigate him to it would run the risk of being indicted for murder, which induced them to refrain from pressing the subject further.

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* "These feats of the Fakeers in no way invalidate the importance of the gospel miracle of the resurrection of Christ. In the latter case, the transfixing of the heart by the soldier's spear was necessarily a mortal wound, from which recovery was impossible unless by a miracle."

"I share entirely in the apparent incredibility of the fact of a ma being buried alive, and surviving the trial for various periods o duration; but however incompatible with our knowledge of physiology, in the absence of any visible proof to the contrary, I am boun to declare my belief in the facts which I have represented, howev impossible their existence may appear to others.*

"I took some pains to inquire into the mode by which such a result was effected, and was informed that it rested on the doctrin of the Hindoo physiologists, that *heat* constituted the self-existe principle of life, and that if the functions of the other elements wer so far destroyed as to leave that one in its perfect purity, life coul be sustained for considerable lengths of time independent of ai food, or any other means of sustenance. To produce such a stat the patients are obliged to go through a very severe preparatio: for a description of which, *vide* the enclosed note.—(Unfortunatel this note did not come to hand with the narrative.—J. B.)

"How far such means are calculated to produce such effects th physiologists will be better able to judge than I can pretend to do I merely state what I saw and heard; and think, that when we consider the incredulity and ridicule, and actual persecution, with which some of the most wonderful discoveries of modern times have been regarded—viz., galvanism, Harvey's system of the circulation of the blood, mesmerism, &c. &c.; that it is presumptuous in any of us to deny to the Hindoos the possible discovery or attainment of an art which has hitherto escaped the researches of European science."—Pp. 10–17.

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* "There may be some hypercritical, suspicious individuals ready to allege, a no direct declaration to the contrary has been recorded in the narrative, that som subterranean communication may have existed, so as to have afforded access t the Fakeer by accomplices during his imprisonment in the *barra durra*, and tha without the possibility of their being detected by the guards surrounding the exterior of the building. When we reflect, however, on the fact, that the object o Runjeet Singh was not to prove, but to *disprove*, the possibility of the success o such an enterprise, it is impossible for us to imagine, with all the precautions narrated as having been adopted by him for guarding against deception exteriorly, that he should not have exercised equal scrutiny and care to guard against *subterranean* intrusion; without which security, all the external precautions would have been a gross absurdity. In fact, such an oversight on a point regarding which the most simple individual would not readily suffer himself to be deceived, would have exposed Runjeet Singh, and the whole of his court, to the suspicion of being accomplices of the Fakeer in the perpetration of a gross public imposture,—a most improbable position for such a prince to place himself and his court in, for such a purpose.

"And again; that Runjeet Singh was sceptical up to the moment of the Fakeer's restoration, is obvious from the terms in which the Fakeer addressed him when he recovered his sight,—'Do you believe me now?' The mildewed state of the bag, as remarked by Sir Claude M. Wade, at the time when the box was opened and the figure first exposed, was most conclusive as to its having been buried for some time.

"Lieut. A. Boileau's case meets all the objections—for the cell, or grave, was lined with masonry, and large slabs of stone covered it, so as to render it impossible for the Fakeer to escape.—*Vide* page 19. Indeed at a subsequent interment of this Fakeer, besides all the precautions enumerated above as resorted to on that occasion, after the box containing the Fakeer was deposited in the cell, locked and sealed, earth was turned in and trodden down, so as completely to surround and cover the box; a crop of barley was sown over it; and a constant guard maintained on the spot. Moreover, twice during the period of interment Runjeet Singh had the body dug up, when it was found to be in exactly the same position as when interred, and in a state of apparently entirely suspended animation. At the expiration of this prolonged interment, the Fakeer recovered under the usual treatment."

2. The account of the next instance of zoo-thapsis, or burial alive, is partly from Sir C. E. Trevelyan, of the Treasury, and partly from the Narrative of Lieutenant A. Boileau of a Journey into Ragwarh in 1835. Both accounts relate to the same individual and the same transaction.

"I perfectly well recollect, that when I was acting as political agent at Kotah, in 1828–30, the Rajah Rana's Vakeel, (who was a very respectable and, for a native Indian, a very truthful man,) told me one day, when he happened to be with me on business, that he had been present that morning with the Rajah Rana at the digging up of a Fakeer, who had been buried, as well as I recollect, ten days; and that after his resurrection he was in good health, and when he had refreshed himself with eating and drinking, was quite himself again. The Vakeel also assured me, that there could be no deception, because the man had been buried in the Rajah Rana's presence, and a guard of trusty soldiers had been constantly stationed over the place until he was dug up.

"I also recollect that the commandant of my escort and the surgeon to the political agency were fully impressed with the belief that the facts of the case were as stated by the Vakeel. They obtained their information from the independent source of some of the Sepoys of the escort, who were present at the digging up; and I received several additional particulars from this source, which I cannot now call to mind, except that the Sepoys stated it as a fact, that some Fakeers and others had a way of drawing in their breath, and thrusting their tongues back and clenching their fingers, which enabled them to subsist for a long time without food, and with very little air.

"I believe the man who was buried at Kotah to be the same person who is spoken of in 'Boileau's Journal,' and that he went from one native court to another to get money by a display of his powers.

"My own belief is, that he really did remain without food, and with only so much air as could reach him in his box underground, for a period of ten days or thereabouts."—Pp. 17–18.

"Just before our arrival at Jesulmer the Rawul has adopted a most singular expedient to obtain an heir to his throne, and the circumstances of the case are altogether so extraordinary that we should hardly have given them credence had they not occurred so immediately under our notice. We were told, soon after our coming, that a man had been buried alive, of his own free will, at the back of the tank close to our tents, and that he was to remain under ground for a whole month before the process of exhumation should take place. The prescribed period elapsed on the 1st of April 1835, and in the forenoon of that day he was dug out alive, in the presence of Goshur Lal, one of the ministers who had also superintended his interment. The place in which he was buried is a small building of stone, about twelve feet long and eight feet broad, built on the west edge of the large tank called Gurressie, so often mentioned. In the floor of the house was a hole, about three feet long, two and a half broad, and the same depth, or perhaps a yard deep, in which he was placed, in a sitting posture, sewed up in a linen shroud, with his knees doubled up towards the chin, his feet turned inward towards the stomach, and his hands also pointed inward towards the chest. The cell, or grave, *was lined with masonry*, and floored with many folds of woollen and other cloth, that the white ant and such insects, should be the less able to molest him. *Two heavy slabs of stone, five or six feet long, several inches thick, and broad enough to cover the mouth of the grave, were then placed over him, so that he could not escape*, and I believe a little earth was plastered over the whole, so as to make the surface of the ground smooth and compact. *The door of the house was also built up, and people placed outside to mount guard during the whole month, so that no tricks might be played, nor deception practised.* * * * Lieut. Trevelyan and I set off together to see what might remain to be seen. The outer wall of the house door had been broken up, the covering of the grave removed, and the body lifted out in the presence of Goshur Lal. The moonshee arrived in time to see the opening of the shroud, as above mentioned, and stated that he was taken out in a perfectly senseless state, with his eyes closed, his hands cramped and powerless, his stomach very much shrunken, and his teeth joined so fast together, that the bystanders were obliged to force open his mouth with an iron instrument, in order to pour a little water down his throat. Under this treatment, he gradually recovered his senses, and was restored to the use of his limbs. * * * * *He conversed with us in a low, gentle tone of voice, as if his animal functions were still in a very feeble state; but so far from appearing distressed in mind by the long interment from which he had just been released, he said* THAT WE MIGHT BURY HIM AGAIN FOR A TWELVEMONTH IF WE PLEASED!

"He is rather a young man, about thirty years of age, and his native village is within five kos of Kurnaul; but, instead of remaining at home, he generally travels about the country to Ajmer, Kotah, Indor, &c., allowing himself to be buried for weeks or months by any one who will pay him handsomely for the same. * * * * This individual is said to have acquired by long practice the art of holding his breath for a considerable period, as during the time that one might count fifty, and gradually increasing at intervals to one hundred, two hundred, and so on as the pearl-divers may be be supposed to do. He is, moreover, said to have acquired the power of shutting his mouth, and at the same time stopping the interior opening of the nostrils with his tongue, which latter feat is at times practised as a means of suicide by the negro slaves in the

West Indies, when suffering under the lash. * * * * As a further preparation for this long burial, the subject of the present experiment abstains from all solid food some days previous to interment, taking no other nourishment than milk, which is believed by the natives to pass off almost entirely by the urethra, so that he may not be inconvenienced by the contents of the stomach or bowels while pent up in his narrow grave."—Pp. 18–20.

3. A third example of temporary enclosure within the tomb is the following:—

"One day, an officer, formerly in the East India Company's service, was waited upon by a Brahmin, who held the public office of Chowdrie.—The Chowdrie is a civil functionary who has the superintendence of courts, and all public transactions or feats within his district; but he is subordinate to the staff-officer in regard to all which occurs within what is called the military limits or cantonments, so that, in all which appertains to the said localities he is, in the first place, obliged to obtain the sanction of the British officer in command. The Chowdrie told the officer, that the object of his visit was to obtain his sanction for one of his sainted countrymen,—who had come hither for the purpose of performing one of those feats above referred to,—to bury himself for nine days within the military boundary. He moreover added, that an immense number of people had assembled from the neighbouring country to witness the holy man perform the said feat. To this the officer replied, that he did not believe any man was such a fool as to suffer himself to be buried alive for nine days, because in such case he must inevitably perish; and, having said so, he dismissed the chowdrie abruptly, without complying with his request.

"Shortly thereafter, however, the Chowdrie returned to urge the officer to comply with the request of the Fakeer, assuring him that the holy man was proposing it in good faith, and was most anxious to be permitted to do so within the military limits, as affording better proof that there could be no collusion than if he did so elsewhere; he also added that he had frequently done so before, and that his sanctity would save him on this as on former occasions. The Chowdrie even went so far as to say, that his sanctity had given him such power with God, that he could remain for any length of time he chose under ground with perfect safety. At length the officer replied, 'Well, if the man is determined to bury himself, you shall have my sanction for him doing so within the military limits: but remember this, that I shall take care that *no tricks shall be played, but that he shall be buried in good earnest;* and, the more certainly to secure this, his grave shall be surrounded the whole time by a guard of Mussulmans, so that no Hindoo shall approach it during his sepulture.' With all this the Chowdrie was perfectly satisfied, seeming firm in his faith that the sanctity of the holy man was quite sufficient to save him during this extraordinary trial.

"Hereupon the officer instantly gave instructions to an orderly to send a corporal to see the man fairly buried, and to set a sentry, to be relieved in the usual manner, to keep strict watch over th grave during the whole of the nine days, and to suffer no one even t approach the grave; and, the more certainly to secure this bei faithfully accomplished, none but Mussulmans were to be depu as guards.

"In a few hours, after these orders had been issued by the sai officer, the corporal returned and announced to him that, after cer-tain proceedings on the part of the saint, and receiving many gif from the assembled multitude, he laid himself down and pass into a particular condition, after which his followers wrapped his bod in a covering called a 'kumlee,' and then laid him in a grave du in the ordinary way and of the usual size, from three to four fee deep, and then turned in the earth upon his body. No coffin was use On this being done, a Mussulman guard was placed, with orders t walk round the grave, and on no account to suffer any one even t approach it.

"Every two hours reports were brought to the officer or his orderly that fresh guards had been set to relieve those on duty, and that all remained as when the earth was thrown over the devotee. So invincible was the hatred of the Mussulman guards against the Hindoos, that they would not suffer any one of them even to approach the grave to get a particle of the sacred earth (a gift inestimable in their opinion) which covered the holy man, whom the Hindoos firmly believed would rise again on the ninth day, as predicted by him.

"On the evening of the third day, when other active and important duties had entirely banished from his mind the condition of the buried Fakeer, the officer's attention was drawn to the subject by the person who came to report to him that the sentry had been relieved, and the 'dead man all well;' that was to say, remained as at the time he was buried, three days previously. On this announcement being made, the officer, whose faith was less vigorous than that of the Hindoos as to the sanctity of the devotee being able to save him under such circumstances, became alarmed, inasmuch as the feat having taken place with his sanction, within the military limits, and he having set a sentry over his grave, should the man be really dead, as he had no doubt must be the case even then, he might be brought into trouble and arraigned as accessory to his murder, and lose his commission, with other dire consequences.

"The officer, therefore, hurried home, and instantly sent for the Chowdrie, who applied to him for his sanction for the feat to take place within the military boundary, told him his doubts and fears, and urged the instant disinterment of the devotee. The Chowdrie hereupon begged to assure the officer that there was no cause whatever for alarm about the safety of the buried saint, as he had been frequently buried in the same manner, and added, that, so great was his sanctity, that he would be perfectly safe, and certain to recover were he to remain in his grave for twelve months or for a hundred years, and he therefore urged upon the officer to allow him to remain in his grave for the full term of nine days, originally stipulated for. Military faith and courage, however, were by no means equal in this instance to that of the Brahmin, and the soldier quailed whilst this enthusiast stood firm, urging the full term of the feat to be exhausted before the exhumation should take place. The officer, however, would not consent to this, but insisted on the instant disinterment of the holy man; and moreover, by way of self-defence, in case the worst of his fears should be realized, he ordered the Chowdrie, in case the devotee was found to be really dead, instantly to have his body carried beyond the military territory.

"The more certainly to guard against all further mischance, my friend instantly ordered his horse and rode to the spot, that he might be an eye-witness of all the future proceedings. When he arrived at the place, he found the grave surrounded by an immense crowd of Hindoos, all anxiously waiting to witness the result of this exhumation or resurrection of their sainted brother. The Chowdrie having arrived also, orders were instantly given to remove the earth and drag forth the body of the holy man. To the horror of our military friend, forth it came, wrapped in its camel-hair coverlet, on removing which, he found the body cold and stiff as a mummy. When he had satisfied himself of this by personal examination, both by sight and touch, he felt assured that his fate was sealed, that his commission would be lost, and himself implicated in the murder of this religious enthusiast.

"There was yet one hope, although to him apparently a forlorn one, that the Fakeer might be restored by the use of those means of restoration which two of the holy man's followers were about to apply, according to instructions which he had previously given to them. They began by rubbing some preparation over his head, eyes, eye-brows, and also over the palms of the hands and soles of the feet, and were particularly assiduous of their application of it, and friction over the region of the heart. They had persevered in these attempts for about a quarter of an hour without the slightest apparent impression being made on the subject, and the Christian's hope was now completely extinguished. Not so that of the idolaters of the East. The plied their manipulations with unremitting assiduity, and presently were enabled to open the eyes. Still it was but the glassy look of the eyes of a corpse. By degrees, however, slight motion of the eyes was discernible, which increased until he could slowly move the head; and, after lengthened manipulations and pummelling about his chest, a visible heaving of the chest took place, and still later he was able to articulate a few words, to the unspeakable joy of the Christian master of the ceremonies, as well as of the Hindoos and Brahmins assembled on the occasion.

"In about an hour the Fakeer had pretty well recovered the use of his faculties, mental as well as physical, and the major left the field quite as much gratified to find he had escaped the loss of his commission, and the risk of being arraigned as accessory to the murder of this devotee, as the latter was to remain and receive the numerous presents and mutual congratulations of his admiring and adoring countrymen."—Pp. 22-26.

Mr Braid thinks that the evidence afforded by these narratives proves beyond doubt that the individuals referred to possessed the faculty which they represented themselves to have acquired, and actually performed the acts which they undertook; and in order to explain the apparent difficulty of remaining so long in a thanatoid or death-like state, he thinks that they were self-hypnotists, that they had put themselves into a state of temporary hybernation or trance, during which some degree of vital action continued; or, as Mr Braid figuratively expresses it, the lamp of life was still slowly burning.

Upon further inquiry into the manners of these fanatics, Mr Braid finds it stated, that it is an established custom among the Yogis, or Faquirs, when they feel themselves overtaken with disease so violent and obstinate that it threatens death, to get themselves enclosed within the tomb, apparently in order to escape the anticipated pangs of dying.

"Thus, then, they die voluntarily, in order that they may escape the ordinary pangs of dissolution; that is, they reduce themselves to the deep state of self-hypnotism, which I have likened to trance or hybernation in man, in which condition they are committed to their tombs or graves, as their final earthly resting-places. Now, it appears to me no very improbable supposition to allege, that accident had revealed to them the fact, that some of those who were thus buried might be restored to life after exhumation,—the action of the air restoring respiration and circulation, on *an accidental disinterment of the body of some one thus interred;* and the fact once observed would encourage others to try how much *they* could accomplish in this way, as the newest and most striking achievement which they could perform in token of the divine origin and efficacy of *their religion over that of all others.*

"We have the analogue to these feats of the Fakeers, not merely in the hybernating animals which periodically pass into the torpid state, and which, consequently, in them, is looked on as a mere matter of course, and not at all to be wondered at; but we have it also occurring spontaneously, occasionally in the human species, in the disease called catalepsy or trance. Many cases of trance are upon record, in which the patients remained for considerable periods of time in a state of apparent death, during which preparations were being made for their interment, but who were restored before being buried; whilst there is no doubt of the fact, that, in many others, they had been consigned to their graves whilst yet alive,—for, in some such instances, accidental circumstances have led to the opening of their graves, by which means they were released, and lived for years thereafter. In the latter cases, the feats of these Fakeers have been fully realised in all but the *intention* and *artificial contrivance* of the patients *inducing the condition;* and, in the former, had the subjects been actually interred, and their graves opened in proper time, the like results would have ensued.

"Besides the numerous cases of trance already recorded, I have had the history of several others communicated to me, in two of which the patients remained in the horrible condition of hearing various remarks made about their death, and preparations which were making for their interment. All this they heard distinctly, without having the power of giving any indication that they were alive, until some accidental abrupt impression aroused them from their lethargy, and rescued them from their perilous situation. On one of these occasions, what most intensely affected the feelings of the entranced subject, as she afterwards communicated to my informant, was hearing a little sister, who came into the room where she was laid out for dead, exulting in the prospect, in consequence of her death, of getting possession of a necklace of the deceased.

"In like manner, in cases of catalepsy, patients have been known to be alive, and still to remain for a great length of time in a state of insensibility and torpor of all the vital functions to an alarming degree, and to subsist for considerable periods of time without food. This was strikingly illustrated in the case of a patient of my late friend, Dr John Mitchell of this city, of which he furnished me with the following report. The patient was a poor married woman, who was brought into the Manchester Royal Infirmary, and placed under his care. She remained in that Institution in such an intense state of catalepsy, with her jaws locked, that she neither had *meat* nor *drink* for FOURTEEN DAYS, after which she became so much relieved, that she could be removed to her home, about seven miles in the country.

"During the period this patient remained in the cataleptic state, the only visible signs of vitality were, a *slight* degree of animal heat, and appearance of moisture from her breath when a mirror was held close to her face. Every variety of contrivance and torture was resorted to by various parties who saw her, for the purpose of testing the degree of her insensibility, and for determining whether she might not be an imposter, but without eliciting the slightest indication of activity of *any* of the senses.

"A most important fact has since been communicated to me by this patient's friends,—a fact which merits the most serious consideration of all who come in contact with such cases, viz., that whilst she had no voluntary power to give indication, either by word or gesture, that she suffered from the said inflictions, nevertheless she *heard and understood all that was said and was proposed to be done, and suffered the most exquisite torture from various tests applied to her.* A fact so important as this ought to be published in every Journal throughout the civilised world; so that in future professional men might be thereby led to exercise greater discretion and mercy in their modes of applying tests to such patients. It may have been excusable to have done so when unaware that they might thereby be inflicting torture upon a helpless and passive human victim; but, after being made aware of this example to the contrary, they would be altogether inexcusable.

"The same discretion ought also to be extended to the modes of testing somnambules. There is no doubt whatever, that in certain stages of that condition, whether occurring spontaneously or induced by artificial contrivance, that some of these patients are perfectly insensible at the time of inflictions the most severe. However, if the means have been sufficiently severe to lacerate, or in any way destroy the tissues, the natural consequences of such inflictions necessarily manifest themselves after the patients are aroused. Thus, in a patient of my own, about whom I was first consulted for an attack of spontaneous somnambulism, besides violent pinchings of her flesh and skin, needles and pins were thrust under her nails, and so anxious was her father to determine whether she might not be imposing on them, as had been suggested to him by some *kind* friend, that he so pinched and bruised the roots of her nails as caused them subsequently to suppurate, and that without her giving the slightest indication of feeling pain at the moment of infliction, or during the sleep. When the poor girl awoke, she wondered what was the matter with her fingers, and what could have made them so painful. This patient was very soon cured of her natural somnambulism, simply by inducing a similar condition artificially by the mode which I designate *hypnotising*. On one occasion, when I had hypnotised her, I extracted one of her teeth without the slightest indication of her feeling pain, nor was she aware of it after she was awoke, until her father asked her to feel in her mouth. This patient has now been in the enjoyment of good health for several years, and has never been subject to spontaneous attacks of somnambulism since I first cured her by *hypnotism*."—Pp. 27–31.

Mr Braid then enters into a discussion on the physiological effects of Bang or Haschisch, which effects, he argues, seem in many instances to resemble the state of the system described as Catalepsy. In the course of this discussion, he quotes the authority of Moreau, and that enterprising traveller, Mr David Urquhart. It has been long said that the chief ingredient in the Haschisch is the Indian hemp, or rather the extract of that herb. But this has never been proved in a satisfactory and irrefragable manner; and as the pure extract, or the tincture of Indian hemp, does not in all instances produce the peculiar intoxicating effects of Haschisch, it seems premature to infer that the latter consists of this alone. It is much more probable that it is a compound vegetable narcotic, consisting of several narcotic drugs. On this, however, it is unnecessary at present to dwell. We fear that it can scarcely be admitted without considerable violence to facts, that the intoxication and spectral delirium produced by the use either of haschisch or Indian hemp, bears such a resemblance either to the apparent and temporary lifeless state of the Indian Faquirs, or the phenomena of catalepsy, that a just comparison can be drawn between them. It is nevertheless competent for every one to have his own opinion on this point; and to those who wish to study the subject, the inquiries and remarks of Mr Braid may be serviceable.

More entitled to attention, nevertheless, is the comparison instituted between the thanatoid state of the Faquirs and the condition of Hybernation among some of the lower animals. On this point the author expresses his views in the following manner.

"In warm-blooded animals which hybernate completely, such as the marmot, the power of generating heat is so feeble, that the temperature of their bodies follows pretty nearly that of the surrounding air; so that, at a temperature a little below the freezing point, the thermometer placed within the body falls to 35°, and may remain at this point for some time, without apparent injury to the animal, as it recovers when subjected to a higher temperature. It is thus obvious, that the vital properties of the tissues had been preserved during this state of arrest or depression of their usual vital activity; but when long subjected to a much more intense degree of cold, it has been found that there is not merely a temporary suspension of activity, but that total loss of life is the result.

"During hybernation, all the vital functions are proportionably depressed below the natural standard. The pulse is reduced to one-tenth its usual number of beats, and the breathing to about one-thirtieth the number of respirations, while it is accomplished with very little perceptible heaving or enlargement of the chest. Now the activity of respiration and quantity of carbonic acid gas eliminated in a given time being the surest test of the general activity with which the vital functions are progressing, it thus becomes obvious that they must all be greatly depressed during this condition, and that, consequently, the disintegration and waste of tissue must be going on at a very slow rate compared with that of the normal active condition. Such is actually found to be the case, and, consequently, these creatures, when in that state, can subsist for a great length of time without food, merely consuming a portion of their own tissues, and that at a very slow rate. They are thus enabled to live without food for a period far beyond what could possibly happen with them during the active state of their existence.

"When in an *intense* state of hybernation, moreover, sensibility is so depressed as seems completely to lock up all the senses; but, when in a less intense degree, there is merely diminished sensibility.

"Even in the cold-blooded animals, the activity of the functions and demand for oxygen are less at low than at higher temperatures, as has been beautifully shown by the experiments of Dr Edwards. Thus, during winter, as I have myself frequently witnessed, frogs can live and move under the ice without the necessity of coming to the surface to breathe, the aerated water surrounding their bodies being sufficient to produce that change on their blood through the skin, requisite to sustain the demands of their feeble life at that low temperature; but, when the season advances, with the increased temperature, the activity of the animal ensues, when it becom indispensable that it shall be permitted to come to the surfac breathe occasionally; and if prevented from doing so after the h has become considerable, the creature speedily dies."—Pp. 45, 4

The foregoing observations communicate a view of the phe mena of hybernation and the state of the functions in gen correct; and this, it appears to us, ought to prevent Mr Braid f drawing a very close parallel between hybernating animals and F quirs in a state of apparent death, and enclosed within a good w built tomb. In the instance of animals, as marmots, hamste and others, in a state of hybernation, respiration proceeds, tho in a very languid and faint manner, and the animals are not e cluded entirely from air. In the instance of the Faquirs, accor ing to the accounts, the first step is to exclude air by plugg the nostrils and ears, and by the performer himself turning ba the tongue, so as to close the larynx. And here another dif culty presents itself. It is well known that the West Ind negroes often commit suicide by carrying the tongue back in the throat so as to close the larynx. In these instances the pe formers are suffocated without ever coming again to life, qu as completely as if they were hanged, strangled, or smother Now, how does it happen that the same result does not ta place to the fanatical Faquir? All these circumstances constitu difficulties, which must prevent scrupulous and strict reasoners from admitting the parallel between the marmot and hamster o the one hand, and the Faquir on the other.

We quite admit the fact of persons remaining a considerab time without food or drink. Many authentic cases serve to sho that, under certain circumstances, life may be continued for man days without either food or drink. But the great difficul regards its continuance when the exclusion of atmospheric air complete.

The author then proceeds to invoke the aid of Cataleptifor and Trance-like cases, in order to throw light upon the proble The following is one of the instances of Trance taking place a hysterical patient.

"The case of the young lady, Miss F. C., related to you by m esteemed friend, Mr Waddell, was one of hysteria, terminating i trance of *four days' duration*, It was not caused by her hearing o the death of her father, or any unpleasant news; her father wa dead some years at the time of her illness. She laboured unde chlorosis, and, in consequence of this, and her complexion bein naturally very fair and pale, with white flaxen hair, she had a ver corpse-like appearance. Her pulse, which was quick and chloroti before the trance commenced, became soft and slow. Her breathing although slow and weak, was always quite perceptible. She woul open her eyes when pulled and shook by the arms, and then close them and fall asleep again. It was with great difficulty that she was forced to swallow a few teaspoonsful of drink for three or four days; and any person looking at her, without feeling her pulse and examining her closely, would say she was dead. Although I, her only medical attendant at the time, and her friends, could not but feel very uneasy and anxious about her, yet we always entertained hopes of her recovery, which did not take place suddenly, as we learn that the greater number of cases of trance do, but gradually; leaving her very weak for some time, and, as well as I remember, totally unconscious of anything that occurred during its continuance.

"About twenty years ago, my friend, Dr Jarrold of this city, attended a gentleman, forty-four years of age, who fell into a state of trance, in which he continued for a whole week. During this period the doctor watched him closely, and informs me that the vital processes were reduced to such a low ebb, that he had no expectation of his patient's recovery; the pulse being scarcely perceptible, and the respiration faint, and repeated only about *once in three quarters of a minute*. After continuing in this state for *a week*, without swallowing a particle of food or drink, he awoke from his trance, and called for *beef-steaks*, when the doctor had the pleasure of seeing him make a hearty meal. He recovered from this affection, and lived a year thereafter, when he died from a different disease.

"The following narrative of another case I give *verbatim* from a letter of the patient's sister, furnished by her to me for publication. The lady writes:—'She and my eldest sister walked to church, scarcely a mile through the fields from their house. Without giving any intimation of feeling unwell, she dropped down in a faint. She was carried out of church to the manse, and though every possible means were tried to restore her to consciousness, *she lay from Sabbath mid-day till Wednesday evening, without giving any sign of life*. It was exactly a fortnight from the day she fainted before she opened her eyes; but from the fourth day she gave occasionally signs that she knew what was said to her.' She adds that two medical men attended this patient throughout her illness, one of whom remained with her on the night when a crisis seemed to be approaching, of which she says:—'Little hopes they had that it would terminate so favourably; by which it appears that they expected her death at the period when she revived. She took no food during the fortnight she remained in the trance.

"In an early number of 'The Philosophical Translations,' Dr Oliver has given an account of one of the greatest sleepers on record. The patient was Samuel Chilton, of Tinsbury, near Bath. He was a labourer, twenty-five years of age, not fat, but muscular, with dark brown hair. In 1694, he fell asleep, and slept for a month, when he awoke, and went about his work as usual. During this period, he partook of food set beside him, and had the usual evacuations, without awaking. In 1696, he again fell asleep, and continued in it for seventeen weeks, during the *last six* of which *he* *ate nothing*. During the former period, therefore, he was in the semi-waking condition, during which there is present a certain degree consciousness and voluntary power, resembling those animals which sleep most of the winter, but rouse up sufficiently, occasionally, to enable them to feel hunger, and satisfy the craving for food, which they do by partaking of a portion of what they had stored up for themselves during the preceding autumn. During the latter period, however, like the animals which hybernate completely, he must have survived entirely by consuming a portion of his own tissue. It is much to be regretted that no mention is made as to the extent of emaciation which took place during the latter six weeks, when he ate *nothing*, because, in all cases of long protracted fasting, whether the patient is asleep or awake, we may be quite certain that some collusion is going on by which food is clandestinely obtained by the faster, if there is not some perceptible wasting of the body of the faster. To believe the contrary, would be to admit an impossibility. —namely, that we might abstract continually from a given quantity, without diminishing the original amount.

"Samuel Chilton again fell asleep in 1697, and slept for six months. His habits, in respect to food, during this period, are not recorded. Many extraordinary and cruel inflictions were perpetrated on his person during these periods, for the purpose of gratifying the curious, and enabling them to determine whether he had any feeling, or whether he might not be an impostor. He gave no inclination of feeling pain at the time, nor does he seem to have had any recollection whatever of these inflictions when he awoke."—Pp. 51–54.

He then shortly notices the case of the collier who was confined within a coal pit in Ayrshire in 1835, for twenty-three days without food, and of which an authentic account is given in the seventy-second volume of this Journal, p. 488.

From all the facts and arguments thus adduced, Mr Braid thinks that it is impossible, as many have done, to regard the performances of these Hindoo fanatics as mere juggling tricks, but that they are to be received as instances of human hybernation, which, he consequently maintains, must be recognised as a physiological fact. He then, as practical applications, deduces the three following inferences.

"1. That great discretion ought to be used in applying tests for the purpose of determining the extent of torpor of the senses which may exist in any particular case, because it is quite possible that the patient may suffer intensely from such inflictions, without being able, at the time, to give any sensible sign of doing so, from the existence of a complete paralysis of all voluntary power; such as occurred in the case of Dr Mitchell's patient, and in many others who recovered after having been considered dead, and who declared that they heard and understood all that was said regarding them, and the preparations which were making for their interment, without having the power to give any indication that they were alive.

until some accidental abrupt impression aroused them from their lethargy, and rescued them from their perilous situations.

"2. That all tests which would produce laceration or permanent injury of tissue should be avoided, even in that class of patients in whom loss of feeling is complete, or who remember nothing of it afterwards, because, although not felt by the patient at the time of infliction, nor remembered afterwards, whether the state of loss of feeling may be the consequence of spontaneous trance, or anæsthesia induced by hypnotism, mesmerism, chloroform, hachisch, or any other narcotic, such inflictions are certain to manifest their natural baneful influence on the patient, after he is restored to the normal state of sensation,—as was evinced in the case of the natural somnabulist to which I alluded.

"3. And the third inference is of still greater importance; namely, that in all cases of trance, and indeed in *every case of death*, no patient ought to be interred until there have been indubitable signs of decomposition of the body, because, without this appearance, there is no certain sign of death;—and nothing could be more horrible, either to the survivors or to the apparently dead, than the idea of themselves or their friends being buried alive, not as the Faquirs, with the hope of being released at a stipulated period, but with the certainty that there was no hope of their escape from the grave to which they had been consigned."—Pp. 56, 57.

He then proceeds,—assuming that the death-like state of the Faquirs, hypernation, and catalepsy or trance, are all three similar or identical modifications of the system,—to inquire what is the best mode of treating cases of catalepsy or trance, so as to avert the danger of these thanatoid conditions being mistaken for actual death, and the subjects of them consequently being buried alive. In this he agrees with most authors, that catalepsy and trance show their alliance with the hysterical state, and the interruption and derangement of the catamenial function; and that, consequently, the distinct indication is the re-establishment of that function. As, however, all these symptoms are so much under the influence of the hypnotic methods of treatment, that is, the induction of hypnosis by artificial means, he maintains that this affords, not neglecting other means, the method most likely to be attended with beneficial results. He then adduces several cases, most of them in nervous and delicate females, to illustrate and enforce the therapeutic efficacy of this method of management. We subjoin only one, which, as it took place in his own person, is probably, if not more, entitled to attention, at least sufficiently curious to deserve being made known.

"In the middle of September 1844, I suffered from a most severe attack of rheumatism, implicating the left side of the neck and chest, and the left arm. At first the pain was moderately severe, and I took some medicine to remove it; but, instead of this, it became more and more violent, and had tormented me for three days, and was so excruciating, that it entirely deprived me of sleep for three nights successively, and on the last of the three nights I could not remain in any one posture for five minutes, from the severity of the pain. On the forenoon of the next day, whilst visiting my patients, every jolt of the carriage I could only compare to several sharp instruments being thrust through my shoulder, neck, and chest. A full inspiration was atttended with stabbing pain, such as is experienced in pleurisy. When I returned home for dinner I could neither turn my head, lift my arm, nor draw a breath without suffering extreme pain. In this condition I resolved to try the effects of hypnotism. I requested two friends, who were present, and who both understood the system, to watch the effects, and arouse me when I had passed sufficiently into the condition; and, with their assurance that they would give strict attention to their charge, I sat down and hypnotised myself, extending the extremities. At the expiration of nine minutes they aroused me, and, to my agreeable surprise, I was quite free from pain, being able to move in any way with perfect ease. My suffering was so exquisite that I could not imagine any one else ever suffered so intensely as myself on that occasion; and, therefore, I merely expected a mitigation, so that I was truly agreeably surprised to find myself quite free from pain. I continued quite easy all the afternoon, slept comfortably all night, and the following morning felt a little stiffness, but no pain. A week thereafter I had a slight return, which I removed by hypnotising myself once more; and I have remained quite free from rheumatism ever since, now nearly six years. Was there the slightest room to doubt the value and efficacy of hypnotism in this case?"—Pp. 63, 64.

The concluding question it is not very easy to answer; and we leave readers to exercise their discretion.

In the foregoing observations, it has been the object to make the readers acquainted with the peculiar hypothesis of Mr Braid, rather than to express any opinion upon the merits of that hypothesis, or its adequacy to explain the phenomena for which its aid is invoked. Upon the merits, indeed, of the hypothesis, it is not easy to form an opinion; and if an opinion must be pronounced, the most eligible course is to leave the matter to the judgment of readers. Nothing is so necessary in scientific subjects as the right of private judgment. So multiplied are the sources of fallacy as to the validity of all human testimony; so difficult is it to ascertain, with any degree of assurance, the truth of certain classes of facts, that he must either be a very bold man, or one of small experience indeed, who will maintain that the performances of such unprincipled fanatics as the Faquirs, surrounded as they are by the most bigoted, ignorant, and fanatical of eastern nations, slaves of the most blind and degrading superstition, are ascertained beyond the possibility of doubt.

It was the saying of one who knew mankind well, that it is difficult to say whether the tendency to lie or the disposition to believe be strongest. If this be the case among the educated natives of Europe, what must be said of the natives of Hindostan, where all testimony goes to prove, that to lie, to deceive, and to cheat, is the rule, while to speak truth and act with honesty is so rare, that they can never be depended upon? It is well known that they know nothing of the obligation of an oath, and that to cheat the accursed Feringees is only a meritorious service. At the same time, we wish not to be understood to throw any imputation upon the testimony of the correspondents of Mr Braid. A subject surrounded with difficulties they have investigated with great care and attention. Many persons, nevertheless, without incurring the charge of unreasonable and uncandid skepticism, may justly desire to withhold assent to statements, which, as they are given, imply so great a deviation from one of the usual conditions of animal life, that the subject demands at least more full investigation. Was the atmospheric air perfectly excluded, or were there still means of access of so much air as might sustain life? Mr Braid has also evinced great ingenuity in referring the alleged facts to a general principle; and even though several of the details do not, perhaps, without some degree of violence, accommodate themselves accurately to the principle, it must be allowed that the attempt is laudable. His book deserves attentive perusal, both for the statements which it contains, and for the reasonings with which the author has connected them.

Art. III.—*Pathological and Surgical Observations on the Diseases of the Joints.* By Sir Benjamin C. Brodie, Bart., V.P.R.S., Sergeant-Surgeon to the Queen, Surgeon to H.R.H. Prince Albert, formerly Surgeon to St George's Hospital; Foreign Correspondent of the Institute of France. Fifth Edition, with alterations and additions. 8vo. Pp. 399. London, 1850.

The first edition of this work appeared so long ago as in 1818; and at that time we gave, in our fifteenth volume, such an account of its contents as in that form and period appeared to be requisite. A second edition appeared in 1829, and a third in 1834, the last with so many additions and alterations that an account of the work was in the same year given in the forty-second volume of this Journal. Since that time the work has gone to a fourth edition in 1841, and at present a fifth edition, always with those improvements and extensions, both in pathology and therapeutics, which the ample experience and the excellent judgment author have enabled him to introduce.

In the fifth edition, which is now before us, very great ch have been effected. In some of the chapters retrenchme abridgment have been observed in one section, and in an where the author has found it requisite, he has entered into ample details; while, in all, the number of individual cases less where they tended manifestly to illustrate the nature o obscure and doubtful form of disease, has been diminished.

In the second section of chapter first, on the Causes and Sy toms of Inflammation of the Synovial Membranes, Sir Benj Brodie has considered that disease more particularly in its tion to the influence of constitutional causes. The conne between inflammation of these membranes and the patholo cause or causes of gout and rheumatism, have, it is well kno become a sort of admitted principle in modern Pathology. T this connection Sir Benjamin Brodie attaches due importa whether it be symbolized by the presence of an unusual am of lithic acid in the blood, and lithate of ammonia in the uri the instance of gout, or by the predominance of lactic acid in system in the case of rheumatism. But he adds, that, practic it is not always easy to distinguish gouty from rheumatic infl mation of a synovial membrane, and that whatever the acid of perspiration may be, a want of perspiration which causes one dividual to be liable to rheumatism, will render another equ liable to gout.

Then it is to be remembered, that under the general name rheumatism are confounded many diseased states which have origin entirely different. Examples of this are found in the p ful affections of the bones and joints which follow symptoms syphilis and the use of repeated courses of mercury. These pa ful disorders in the former case Sir Benjamin Brodie ascribe the presence of the syphilitic poison in the blood. Sir Benjam consequently thinks, as many others have been doing for so time past, that there are various morbid conditions of the blo and probably of the nervous system, producing a liability to lo inflammation, while the preference which the inflammatory act evinces for one part or tissue more than another, is to be refer to the agency of local and accidental circumstances. Explic he observes, that it is not remarkable that the synovial membra should be more frequently the seat of inflammation than serous membranes to which they bear so great affinity in struct when it is considered that the organs to which they belong in a state of constant motion, and that they are, except in a instances, particularly exposed to the influence of the vicissitu of external temperature.

To this part of the subject we may possibly afterwards revert.

In treatment the author probably attaches more importance to the use of internal general remedies, not neglecting topical applications, than in the former editions.

In the present edition, the fifth chapter, on Scrofulous Disease of the Joints originating in the Cancellated Structure of the Bones, is made the fourth; while the fourth chapter of the third edition, on Ulceration of the Articular Cartilages, becomes in the present the fifth.

In this fourth chapter, the principal points deserving attention as new are the following.

Along with the fluid (serum) effused into the cancellated structure, the bone possesses less than its normal proportion of earthy matter. This deficiency, however, is not peculiar to this disorder. A detailed account of the disorder as it affects the hip joint, the knee-joint, and the joints of the tarsus and carpus, is then given. This is most minute as to the hip-joint, in which the disorder often terminates in consecutive luxation of the head of the femur upon the dorsum of the ilium, less frequently forward upon the ramus of the *os pubis.*

The morbid action in this form of articular disease was fully explained in the Article in volume forty-second; and it is unnecessary now to recur to the subject.

On the subject of treatment the following observations from the author deserve particular attention.

"The practice which has appeared to me to be, on the whole, the best, is the following. An opening having been made with an abscess-lancet, the limb may be wrapped up in a flannel wrung out of hot water, and this may be continued until the first flow of matter has ceased, a poultice, or water dressing, being applied afterwards. In some instances, after a short time the discharge ceases; the orifice heals, and the puncture may then be repeated some time afterwards. But where the puncture has not become closed, I have never found any ill consequences to arise from its remaining open. On the contrary, I have no doubt that it is desirable that the wound should not be closed until the abscess has contracted, granulated, and healed from the bottom; and this is one reason for making, not a small puncture, but a free opening with an abscess-lancet. Another reason is, that the matter will escape readily without squeezing or pressure. *All rough manipulation is to be carefully avoided.* It produces hemorrhage into the cavity of the abscess, the ill consequences of which I have already pointed out; and, independently of this, it may excite inflammation of the cyst, attended, where the surface is extensive, with so much constitutional disturbance as to endanger the life of the patient at the time, and materially lessen the chance of his recovery afterwards.

"The treatment of the sinus which is left after the opening of an abscess may be comprised in a few words. If the orifice be disposed to heal prematurely, this may be prevented by the occasional application of the caustic potash, care being taken that the caustic does not enter the sinus itself; otherwise some simple ointment or a water dressing is all that is required. The old practice of probing a sinus scarcely ever affords us any useful information ; nor does it in ordinary cases answer any other good purpose. On the other hand, by irritating the sinus, or even the joint itself, it is often productive of serious mischief. The same observation is applicable, but with greater force, to the use of stimulating injections. I do not believe that they promote the healing of sinuses under any circumstances; but, with respect to those which are now under our consideration, there is no doubt that their operation is highly injurious. I saw a young man who nearly lost his life, in consequence of a surgeon having ventured to inject port wine into a sinus connected with some diseased or dead bone of the pelvis."—Pp. 136, 137

In the progress of this disease there are evidently several successive stages. The author is of opinion, that if the disease have not proceeded to suppuration, the patient may recover with a serviceable and moveable joint, even when a considerable portion of the cartilage has disappeared. Otherwise there is no recovery, except with ankylosis. The ankylosis is at first effected by soft substance. But afterwards perfect bony union takes place; so that when the bones composing the joint are divided by section, the cancellated structure of the one bone is seen continuously passing into that of the other.

The determination of the question of amputation in instances of this species of articular disease, Sir Benjamin Brodie makes to depend upon the point, whether or not there be indications of other tubercular disease in any of the internal organs. It too frequently happens, that when one diseased joint is removed by amputation, another becomes the seat of the same malady, or tubercular deposits in the lungs, the bronchial glands, or in the mesentery, finally destroy the patient. When there is any reason to apprehend such results, amputation, of course, is worse than useless.

In the fifth chapter, on Ulceration of the Cartilages, the matter contained in the Additional Notes of the third Edition is introduced; and some new matter is added.

The chief point deserving attention relates to a particular form of the malady taking place in the shoulder joint, and which, it is stated, is more frequent in females than in the other sex.

"Although from the time when I began the practice of my profession my attention has been directed to the pathology of the joints, and my opportunities of studying the subject have been very extensive, I am quite aware that the results of my observations cannot be offered to the profession as approaching to anything like a perfect system; and that, even if it were in my power to pursue my inquiries for many years to come, there would still be much left to reward the labours of those who may be disposed to engage in similar researches.

"These and all other diseases which, either in the beginning or ultimately, cause an alteration in the structure of the diseased organ, may be considered under two points of view. They may be regarded merely as an assemblage of symptoms, running a certain course; and as such they are quite proper objects of study. They may thus be recognised in the living person, and distinguished from each other; and, without any further knowledge respecting them, we may be enabled to discover efficient modes of treatment leading to their cure. But they may be regarded also with a reference to their more intimate nature, and the changes which are actually going on in the living body; and here a kind of knowledge is required, which cannot be obtained without dissection and anatomical inspection of the diseased parts. The importance of morbid anatomy, in enabling us to obtain a greater insight into disease, cannot be too highly estimated. But it has not the same value under all circumstances. The dissection of a joint, or of any other organ, in the advanced stage of a disease, when all its component parts are involved in one mass of destruction, can give us little real and useful information as to what was the original nature of the disease, or as to the particular texture in which it began; nor can it afford us the smallest help in solving the most important problem of all, namely, the means of cure. It is only from the examination of the changes produced by disease in its very commencement, or before it has made any considerable progress, that we can arrive at any satisfactory conclusion on these points. With the preliminary knowledge thus obtained, the dissections made at a later period become intelligible and useful, and without them they are of little or no value. But the joints are not vital organs; and the diseases to which they are liable being, with few exceptions, of a chronic character, the opportunities of examining the morbid appearances at an early period are of rare occurrence, and can be only accidentally obtained.

"I have made these remarks in order that my object may not be misunderstood in introducing in this place the following account of a somewhat peculiar affection of the shoulder. I cannot so well explain the circumstances belonging to it, as by supposing that the original disease is ulceration of the articular cartilages; but I have not had the opportunity of satisfying myself on this point by dissection; and it is therefore not impossible that in some future edition I may have to transfer the history to another part of the volume.

"The cases here referred to occur more frequently in private than in hospital practice: and (whether it be accidentally or not, I do not know) it certainly has happened that I have met with it more frequently in the female than in the male sex. The patient complains of pain, which however is referred not so so much to the joint itself as to the arm a little below it, near the insertion of the deltoid muscle. At first the pain is trifling, but it soon becomes severe and constant. The patient describes it as a *wearing* pain, of which he is constantly reminded. It is aggravated by every motion of the limb, and by pressing the articulating surfaces against each other. Not only is there no perceptible enlargement of the shoulder, but after some time, in consequence of the want of use and wasting of the deltoid muscle, it seems to be actually reduced in size. It is not long before the mobility of the joint is impaired, becoming gradually more and more limited. When the patient attempts to raise the elbow from her side, it is observed that the scapula is elevated at the same time with the humerus. She is unable to raise her hand to her face, nor can she rotate the limb so as to place it behind her. When the progress of the disease is stopped at an early period, the mobility of the joint may be restored; but otherwise, although the pain and all other symptoms of the disease have subsided, the joint remains stiff, and to all appearance completely anchylosed. Whatever motion the arm is capable of, under these circumstances, depends not on the humerus but on the scapula; and it is remarkable to what an extent the scapula, or rather the muscles belonging to it, will accommodate themselves to this new state of things, so as to make up for the deficient motion of the shoulder.

" It certainly is seldom that this disease terminates in abscess of the joint, when proper attention has been paid to the treatment of it, nor has this happened in any case in which I have had the opportunity of closely observing its progress. I have, however, seen cases of abscess with ulceration of the cartilages, and complete destruction of the shoulder-joint, in which I conclude that, if I had been consulted at an early period, I should have found the symptoms to correspond with those which I have just described.

" Whether it be from this, or from any other disease, that the joint of the shoulder is brought to such an extreme state of disorganisation, one result is, that it is liable to dislocation, or, more properly, to sub-luxation in the direction forwards. In one case, in which I had the opportunity of examining the parts after death, I found the anterior margin of the glenoid cavity of the scapula destroyed by ulceration, the head of the humerus permanently resting on the ulcerated surface. In another case, in the living person, I found the dislocation to be only occasional, the head of the bone slipping forward so as to make a visible projection in certain motions of the arm, and in certain other motions returning to its natural situation.

" I may take this opportunity of noticing another circumstance which, though not of much interest in pathology, is of some importance in practice. An abscess, originating in the shoulder-joint, sometimes presents a peculiar appearance, when it is making its way to the surface. A dissection, which I once had the opportunity of making, will explain at once the nature and the cause of this peculiarity. The abscess, taking the course of the tendon of the long head of the *biceps flexor cubiti* muscle, had suddenly emerged from the joint at the lower end of the bicipital groove of the humerus; then having taken a direction forward, on the anterior edge of the deltoid muscle, had presented itself under the integuments, having a spherical form, so that it might have been mistaken for an encysted tumour. I met with one case, in which this mistake respecting an abscess of this kind was actually made by a surgeon of considerable experience, who proposed the removal of the tumour by the knife."—Pp. 203–207.

The sixth chapter, on Nekrosis of the Joints, may be regarded as new.

In the Third Edition the author introduced, partly in the first chapter, and partly in other parts of the volume, various interesting remarks on affections of the joints in connection with Gout and Rheumatism. Though a few of these remarks are necessarily retained in discussing Inflammation of the Synovial membrane and other distempers, the author has collected in the present edition the whole of his extensive experience in a separate chapter, the seventh, under the title of Chronic Disease of the Joints connected with Gout and Rheumatic Gout.

We may here premise, that we feel it difficult to believe, that the preference manifested by Rheumatism and Rheumatic Gout for affecting the synovial rather than the serous membranes, depends on the exposed position of these membranes, and the frequent and extensive motion to which they are subjected. The true reason, so far as can be seen, we conceive, is the following. Rheumatism or its cause, whatever that may be, whether lactic acid or any other poison in the blood, affects preferably and primarily the aponeurotic sheaths, or *fasciæ,* and the capsules, their continuations over the joints,—in short, the tissues which have been denominated Gelatinous. In this affection, however, of these aponeurotic coverings, the rheumatic disorder often fixes itself upon the capsules, though to these it is not confined. Any one who has observed several cases of lumbago, sciatica, pleurodyne, and cervical rheumatism, may easily satisfy himself of this. When, however, the morbid action does affect the fasciæ at the joints and the capsules, it readily passes from the outer part of the latter to their interior, and consequently to the synovial membranes. Though we submit this explanation, we have no wish to attach to it more importance than it truly deserves.

After this we subjoin from the present author, as much more profitable than anything which we could say, the following observations on the relations, character, and treatment of this disease.

"In the first chapter of this work, I have stated that inflammation of the synovial membranes, as it presents itself under ordinary circumstances, may not unfrequently be traced to a gouty diathesis. It is so in numerous instances, in which, nevertheless, neither the patient nor his medical attendant would admit that there had ever been what is called 'a fit of the gout.' I have referred to rheumatism as a cause of inflammation of the synovial membranes in other cases, and I have also adverted to a peculiar disease, of a very chronic character, which is generally supposed to bear some relation to both gout and rheumatism, and treated of under the name of rheumatic gout. In this disease, inflammation of the synovial membrane is the first of a series of changes which the joint undergoes, and which, in the course of years, ends in its entire disorganization."—Pp. 232, 233.

"In the museum of St George's Hospital there are many other specimens of joints similarly diseased. From these we learn that the lithate of soda is deposited in a variety of textures:—underneath the synovial membrane, on the bone near the margin of the cartilage; on the surface and in the substance of the cartilage; in the cancelli of the bone, and in the cellular tissue external to the joint. In one preparation of the patella, taken from a gouty subject, the cartilage is seen increased in thickness, and presenting a striated appearance, the striæ being at right angles to the articulating surface. In this case the cartilage is described in the catalogue as having been 'in its recent state softer and more yielding than natural, and having a tendency to break up into fibres.'

"Although the opportunities of examining the pathological condition of joints which are affected in this manner are only of occasional occurrence, there is no surgeon of much experience who has not seen many cases of the same disease in the living person, or who, having seen them, will not assent to the correctness of the observation which I have already made, that inflammation of the synovial membrane is the first of the series of changes which the joint undergoes. This is clearly indicated by the symptoms. The deposit of lithate of soda takes place only as the disease advances; and though it is a very frequent, it is not a constant, occurrence. The absence of this deposit is not a proof of the absence of the gouty diathesis. An elderly gentleman was attended by Dr Chambers and myself, labouring under well-marked symptoms of gouty disease. One of the effects produced was a chronic inflammation of the synovial membrane of one knee. The membrane was considerably thickened, and contained fluid. He had been in this state, sometimes better, sometimes worse, for some years. When living at his house in Scotland, he was seized with symptoms of acute phrenitis, of which he died. The body was examined by his medical attendant, Mr Johnstone, who found the diseased joint distended with a dark-coloured glairy fluid, and the cartilages absorbed, but without any white incrustation.

"Indeed, in cases of gout generally, it is difficult to discover any rule by which the deposit of lithate of soda is regulated. One person had his fingers and toes distorted by gouty concretions, at the same time that deposits of the same kind are found in the larger joints, and in the subcutaneous cellular tissue in various parts of the body; while another person, who has been equally tormented by the gout with the former, is altogether free from this additional cause of distress. Probably much depends on the greater or less prevalence of soda in the system, the lithate of soda being an insoluble salt, and in this respect differing from the combinations of the lithic acid with the other alkalies. There is great reason to believe that many of those who are troubled with what are commonly called chalk-stones have much aggravated, if they have not actually produced, the evil, by taking large quantities of soda for the purpose of correcting acidity of the stomach.

"The process by which the absorption of the harder textures takes place in these cases is manifestly very different from ulceration, and is altogether very remarkable. The cartilages disappear, so that the bones are exposed; but the latter present nothing corresponding to the appearance of a carious surface. They bear evident marks of having been subjected to the influence of friction, appearing as if portions of their surface had been scraped off by a chisel. This is especially observable in the knee, where the motions of the joint are only in one direction, and less observable in the hip, where the motions are more various. But the results of friction on the living are very different from what they would be in the dead bone. There is no exposure of the cancellous structure; a process of repair goes on simultaneously with that of destruction, and the consequence is the formation of a hard and compact layer of bone, bearing no small resemblance to ivory, covering the cancellous structure, which must have been exposed otherwise.

"In one of the cases which have been just described, it was found that some new formations of bone, in the shape of small exostoses, had taken place at the margin of the articulating surfaces. I shall have occasion hereafter to refer to two other cases, in each of which portions of such newly-formed bone had been broken off by the motion of the joint, and become loose bodies in the articular cavity. In other cases, masses of new bone are laid on in one part, while the original bone is removed by absorption in another, so as completely to alter the form and character of the articulating surfaces.

"*On the symptoms of this disease.*—The individuals who are most liable to be thus affected by rheumatic gout, are those who have not been accustomed to much bodily exercise, and have at the same time led luxurious lives. I suspect that too great an indulgence in the use of animal food is even more likely to produce it than the free use of fermented or spirituous liquors, and that it is for this reason that it is frequently met with among porters and the upper servants of wealthy families,

"The disease is rarely confined to a single joint, and, in most instances, several joints are affected in succession. Often it shows itself, in the first instance, in a joint of one of the fingers, which is observed to be slightly enlarged and stiff, with an occasional twinge of pain in it. Then, one after the other, other joints of the fingers are affected in the same manner. It was to this enlargement of the joints of the fingers that Dr Haygarth gave the name of *nodosities.* The immediate cause of it seems to be a thickening of the synovial membrane, and probably in part an effusion of serum into its cavity.

Afterwards the disease extends to the other and larger joints, sometimes to a greater, sometimes to a smaller number in succession. In those joints which are superficially situated, so as to admit of examination, fluid may be detected, the quantity of which, however, varies accordingly as the limb is exercised or kept quiet, and is seldom very large. The fluid is more perceptible in the first instance than it is afterwards, on account of the synovial membrane becoming thickened.

"The progress of the disease is generally very slow, so that many years may elapse before it reaches what may be regarded as its most advanced stage. Throughout the whole of its course, it causes no severe pain, but there are constant uneasy sensations, and much distress and inconvenience, in consequence of the joints becoming gradually more rigid and unfit for use. The patient, in addition to his local ailments, always suffers, in a greater or less degree, from the usual effects of dyspepsia, which are aggravated by want of exercise. He is liable to acidity of the stomach, and flatulence after his meals; is nervous and irritable; and every error as to diet, as well as all mental excitement, will produce an aggravation of both the constitutional and local symptoms.

"In a few instances, after having reached a certain point, the disease becomes stationary, or there may be apparently some degree of improvement. But except where it was treated in the very earliest stage, I do not recollect any one case in which there was anything approaching to a cure. In the majority of cases, the disease is progressive, the joints becoming more and more disorganised, sometimes with little, at other times with much, increase in size. That increase, in this stage of the disease, depends not merely on the causes already mentioned, but also on a deposit of new bone in the neighbourhood, and sometimes on that of a gouty concretion in the surrounding cellular tissue. Ankylosis sometimes takes place as an ultimate result. There is little tendency to suppuration. I cannot say that abscess never forms, for I suppose that there are no morbid changes of any kind, in the course of which this may not possibly occur; and, indeed, in one of the cases which I have just recorded, it was believed that there were pus-globules mixed with the semifluid substance which the joint contained. But the formation of abscess in these cases certainly does not belong to the regular order of events, and must be regarded as a rare exception to the general rule. This is a remarkable circumstance in the history of the disease, and forms an important difference between it and the ordinary diseases to which the joints are liable.

"Distressing as such a malady must always be, harassing the patient, as it does, year after year, with no prospect of a cure, still it is an evil varying very much in degree in different instances. In one individual, a few joints only are affected, and these not to such an extent as to prevent him from taking a certain amount of exercise, and enjoying the advantages of social intercourse; in another, scarcely one joint of the extremities remains in a sound state; some are completely ankylosed, and others are so stiff as to be nearly useless. Nevertheless, the patient thus afflicted, a cripple, dependent on others for the means of locomotion, may live for years, reconciled to calamities which have gradually come upon him, and in the possession of a certain amount of comfort amid all his sufferings.

"*On the treatment of this disease.*—In the very commencement of this disease, before any actual disorganization has taken place, and while the joints affected are limited in number, I believe that much may be done towards preventing its further progress. The patient should be placed on a careful system of diet, partaking very moderately of animal food, avoiding fruits, acids, raw vegetables, and sugar, and taking little or no fermented or spirituous liquors. He should take exercise daily, so as to induce perspiration; and, if this cannot be readily accomplished, he may, with great advantage, once in a week or fortnight, make use of the hot-air bath. In addition to such careful management of himself, he may from time to time take alterative doses of the acetic extract of colchicum, combined with a small quantity of the mercurial pill, and occasional purgatives. Moderate doses of potash or magnesia may be given three or four hours after each of his principal meals, so as to neutralise any superabundant acid in the stomach. Soda should be carefully avoided, as tending, by its combination with the lithic acid, to form gouty concretions.

"According to circumstances, however, the treatment may be varied. Thus, when the patient is depressed, as sometimes happens by the use of colchicum, the mixture, composed of rhubarb, magnesia, and ginger, sold under the name of 'Dr Gregory's Powder,' may be taken every night, with an active aperient at stated intervals, and very great benefit will often be obtained from a very long perseverance in the use of these simple remedies.

"Little is to be done by local applications. If, however, there be more than usual pain in a point, leeches may be applied, and, on particular occasions, a bandage, not for the purpose of making pressure, but of limiting motion. In some instances, a light leathern splint, or pair of splints, may be employed with advantage.

"When the disease is fully established, the same kind of treatment will be useful in mitigating its symptoms, and sometimes in retarding its progress. But here, the more active remedies, such as mercury and colchicum, must be reserved for special occasions. The iodide of potassium has the reputation of being useful in cases of this description; and I believe that its reputation is not wholly undeserved. It should be given only in small doses of two or three grains twice daily, but taken, if it agrees with the patient, for several weeks at a time.

"But, after all, no general rule can be laid down as a guide for the practitioner on all occasions. Each individual case forms a study in itself, not only for the medical attendant, but for the patient also.

"In one case, in which the patient was afflicted with this disease in a very aggravated form (so many joints being affected that she lay almost helpless on a sofa, and various methods of treatment having been already employed to no purpose), having learned that cod-liver oil had been formerly supposed to be useful in some forms of rheumatism, I was tempted to prescribe this remedy for her. The purified oil was administered internally, and at the same time rubbed in as a liniment on the affected joints. It was a mere experiment; but there is certainly great reason to believe that it was not altogether unsuccessful. Not only did the disease cease to make progress, but, when I last saw the patient, after she had taken and rubbed in the oil, with occasional intermissions, during a period of seven or eight months, there was a distinct and manifest improvement as to all the symptoms. Indeed the result was such, that, to any other patient under the same combination of circumstances, I shall certainly be disposed to recommend a trial of the same remedy."—Pp. 237–247.

More than once have we had occasion to direct attention to the change that has taken place in many, if not all points of surgical practice during the last thirty years, and especially the disposition which surgeons manifest to avoid operations and mere surgical treatment, and to trust to medical management and the employment of remedies which act through the medium of the constitution. This revolution in surgical opinion, we regard as indicating a more scientific and rational state of matters. Though much of this change must be traced to the influence of the doctrines and example of John Abernethy; yet, as we said in a former article, the two great exponents of this revolution must be allowed to be John Painter Vincent and Sir Benjamin Brodie. It is in the practice and the writings of these two surgeons, that the philosophic observer distinguishes the traces of this great movement; and it is better that it be recognised in the writings of these surgeons than in those of others whose experience might be less extensive, and whose example might be less efficacious. In the present volume, there are several passages which might be adduced in proof and illustration of the truth of these remarks. But to adduce these is quite unnecessary, as the remarks really occur to every reader. The following passage, nevertheless, states the matter in terms so clear and explicit, that it may be given as proof to save further trouble.

"In the early part of my professional life, I was led to follow the practice which was then very generally adopted, of treating caries of the spine by means of setons and caustic issues, one on each side of the diseased vertebræ. A more enlarged experience has satisfied me, that, in the very great majority of cases, this painful and loathsome mode of treatment is not only not useful, but actually injurious. The observations which I made on this subject formerly, with reference to scrofulous diseases of other joints, are equally applicable to cases of scrofulous diseases of the spine. For many years past, I have ceased to torment my patients who were thus afflicted in this manner, and I am convinced that the change of treatment has been attended with the happiest result. There are a few cases only in which I am still inclined to believe that issues or setons may be employed with advantage. The cases to which I allude, occur almost exclusively in adult persons, where there is severe pain in the seat of the disease, and where, from this and other circumstances, we are justified in the conclusion that the caries depends not on a scrofulous condition of the bones, but on disease of the intervertebral cartilages, or a chronic inflammation, probably of rheumatic origin, of the vertebræ themselves. Even in these last-mentioned cases, issues and setons do not seem to form any necessary part of the treatment; and I am not myself in the habit of resorting to them, unless I find that the pain is not relieved by the recumbent posture, and the other remedies of which I shall speak presently. It appears to me also, that, in cases of caries of the spine, as well as in those of caries of other joints, issues and setons are to be employed only in the early stage of the disease, and that no advantage is to be expected from them after abscess is formed.

"An important question here presents itself,—For how long a period is the patient to be confined to the recumbent posture? If there be a reason for it being had recourse to at all, there is also a sufficient reason for it not being abandoned for many months In the great majority of cases, it should be extended to a year, or a year and a half, and where the disease has made extensive progress, even to two or three years.

"In the first instance, the surgeon usually finds it difficult to persuade the patient to continue this part of the treatment for a sufficient length of time after the removal of the more urgent symptoms. Afterwards, however, he often has to encounter a difficulty of an opposite kind. This happens especially among young females, who become at last so habituated to their couch, and the peculiar mode of life connected with it, that they can scarcely be persuaded to make the necessary effort to sit up and move about, even after every reason for not doing so has vanished.

"I have on a former occasion referred to the case of a lady, who, under these circumstances, preserved the recumbent position for such a length of time, that all the joints of the lower extremities in which no actual disease ever existed, from mere want of use, became completely ankylosed. Various attempts were at last made to restore their mobility, but to no purpose, and she still remains in the same condition as when I was first consulted, twenty years ago,—unable to use her lower limbs, or even to sit up.

"Although the maintenance of the recumbent posture may be regarded as absolutely necessary, it is not on this alone that the surgeon should depend for the patient's cure. Attention must be paid to his general health, and, accordingly, as the disease presents one or other character, or as the constitution varies, different modes of constitutional treatment will be required."—Pp. 345-347.

The account now given of this truly valuable performance bears a relation to our limits, not to its own merits. We wish it were possible for us to impress upon surgeons, especially country surgeons, and some young aspirants for operating renown a few only of the useful lessons communicated within its pages. They would then admit the importance of the medical treatment of surgical diseases, and be more anxious to preserve a limb than to amputate one, and above all would they recognise the truth of the principle, that in many diseases of the bones and the joints, though topical remedies are not to be neglected, yet infinitely more valuable and efficient are those remedial measures which operate through the medium of the constitution and which, by improving the state of the functions and of the general health, enable the system to triumph over the disease.

PART III.

MEDICAL INTELLIGENCE.

I. CHEMICAL PATHOLOGY.

On the Relation of the Dumb-Bell Crystals to Uric Acid. By Dr CHARLES FRICK, Baltimore, Maryland. (American Journal of Medical Sciences, July 1850. Vol. xx. N. S.)

OXALATE of Lime, when occurring crystallized in the urine, was, for a long time after Dr Prout described it, believed to appear only under the form of double four-sided pyramids, united by their base, or octahedral crystals. Dr Golding Bird, though he represents the octahedral to be the most usual form of the oxalate of lime crystal, directed attention to a species of crystals assuming the form of a dumb-bell, or a double-headed shot, which he described as occasionally assumed by oxalate of lime, and which were very generally regarded as such after the publication of his work on urinary deposits. The correctness of this opinion Dr Frick is, for several reasons, inclined to question; and having satisfied himself that these reasons are good, and that the true composition of the dumb-bell crystals is not in all instances pure oxalate of lime, but that in many instances these crystals are produced by disintegration of crystals of uric acid, he gives the following facts.

If oxalic acid and lime be added together, the crystals formed under these circumstances are always double pyramids, although at times so small as to be scarcely perceptible; and, however long the deposit may be allowed to remain, neither dumb-bells nor ovals are ever found to make their appearance. Whereas, if a deposit, consisting entirely of uric acid, be carefully washed, and clear water added, we may discover, in a certain number of cases, after the lapse of a few days, that dumb-bells are present, indicating, beyond a doubt, their formation from uric acid without the addition of lime. Dr Frick was led to make this experiment from the following considerations. He had frequently observed in a specimen of urine to which a small quantity of muriatic acid had been added, that, after standing a few hours, although crystals of uric acid only, with a few epithelium scales and a small quantity of mucus, were present, yet, after the lapse of some days, these same specimens would occasionally be found to contain dumb-bells, while the uric acid had either entirely disappeared or presented an amorphous appearance. He inferred that some relation existed between the dumb-bell crystals and those of the uric acid, and that their formation was in all probability subsequent to the elimination of the uric acid by the kidneys. He took pure uric acid, or at least as pure as it could be obtained from urine by repeated washing, and observed, under the microscope, the alterations it underwent from day to day. By setting aside several specimens, and noting the changes that took place from day to day, he observed that, in the first place, the rectangular crystals had a tendency to become irregularly rounded off at their ends, afterwards to be fissured across near their centres in an oblique direction; and, finally these two portions, still adherent, become rounded off in irregular steps towards the periphery of the figure; and this change he has remarked, not once only, but on several different occasions. Should the crystals originally consist of rhomboids rounded off at their oblique angles, we may often observe that these first unite at their points,—the two longitudinal axes being both in the same line,—and then by the extreme points falling off, and these becoming, by degrees, irregularly rounded, they constitute a variety of the dumb-bell crystals in which the concavity of the sides is but slightly marked. Another, and, perhaps, the most common form of this transition stage, is where one end of the base is fully formed, as is also the union between the two, but the opposite head, instead of being round, is elongated to a point. More commonly, they are very irregular in shape, but still with resemblance enough to a dumb-bell to be sufficiently characteristic. It is rare for more than one or two of these crystals, while actually in the transition stage, to present themselves at the same time under the field of the microscope. But within a few weeks past, Dr F. detected, in a specimen of uric acid put aside for this purpose, not only the the dumb-bells in their formative stage, but also several fully formed, as well as some crystals of uric acid almost unchanged. This was copied from the field of the microscope, and is presented in the wood-cut that accompanies these remarks, with the exception of the two figures marked four, which were observed on another occasion.

Close attention will also enable the reader to perceive that the ovals usually described as separate figures from the dumb-bells, are in fact identical with them; the apparent difference being in reality due to the different planes in which they are seen. Some of these are transparent dumb-bells, with a very slight concavity at the sides surrounded by an oval, the interval between the two being filled up with a black space; while others, again, appear to be dark ovals, with a small transparent square set in the middle. If these are made to revolve on their short axis, it will be seen that one face presents an oval, while a section made at right angles to this is a true dumb-bell. Both these forms, if the deposit is of any size, are usually seen together, but occasionally one only presents itself.

Dr Frick is unable to speak with certainty as to the original shape of the uric acid crystal which determines the subsequent formation of dumb-bells, but is of the opinion that, in a majority of instances, the rectangle, with a height nearly equal to its base, more than any other form, is most liable to this transformation. They are seldom if ever observed at the time of micturition, and are in fact very rarely seen. Of the many hundred abnormal specimens of urine presented to him during the last few years for examination, he does not remember to have seen them but on four occasions, and in each one of these the urine had been voided twenty-four hours previously.

In his description of these figures, Dr Bird states that "they are produced in all probability by a zeolite arrangement of minute acicular crystals" (of oxalate of lime). But this, Dr F. thinks, cannot be the case. There can be no lime entering into their composition, for he shows that their formation takes place when there is none of this substance present; but at the same time he acknowledges his inability to explain the exact process that goes on. It would seem, however, from the changes exhibited under the microscope, that this result is one of simple disintegration. All crystalline bodies made up of organic elements have a tendency, by exposure to air or water, to lose their clear, distinct outline and sharp edges, and to become amorphous; and, in all probability, crystals of uric acid of a peculiar shape have, under circumstances which we cannot yet explain, a tendency to break up and agglomerate in certain forms, more or less referable to dumb-bells.

In connection with this subject, Dr Frick mentions a change somewhat analogous that occurs in the crystals of the triple phosphate. The phosphate of magnesia and ammonia, or, as it is more commonly called, the triple phosphate, occurs in the urine under two different forms, one stellar and the other prismatic; and, although both of these present an endless variety of crystallization, yet both may be included under the one or the other of these heads. This difference has been heretofore explained by calling the one a monobasic, and the other a deutobasic salt, under the supposition that twice the quantity of ammonia was combined in the last in proportion to the other. Mr David Steuart of Baltimore, however, has lately called attention to the fact that these crystals may be formed, one from another, by simple aggregation. He succeeded in depositing them from the same specimen in both forms, and also in crystalline shapes intermediate between the two. This he effected by making an acid solution of the phosphate of ammonia and magnesia, and then adding very cautiously a drop of ammonia. This precipitates the phosphates immediately at the surface, a portion of which fall to the bottom of the glass, to be again redissolved. The upper stratum is, after a time, gently shaken, when more crystals fall with the same effect. There is a point, however, if the solution is not too acid, or sufficient ammonia has been added, when some of these crystals remain undissolved, and by carefully setting aside the tube at this stage, and allowing it to remain undisturbed for some time, we may detect, by the microscope, both the prismatic and stellar crystals with their intermediate stages. This experiment Dr F. repeated, and is able to substantiate his opinion in regard to the mode in which these formations occur. Most of the stellar crystals are of two varieties; the first being composed of four rays, and the second of six. In the first we usually find, during this process, that, by aggregation of crystalline material, two prisms are formed which intersect each other at right angles, or else two of the rays which are in the same line become elongated, and material is gradually deposited in the interstices to make up a single perfect prism, the two long arms corresponding to the length, and the two short to the breadth of the crystal. In the second variety, where the figure has six rays, four of these become elongated in a similar manner, and the same deposition occurs as in the other; or else these rays are all joined together at their extremities, and the figure then filled up constitutes one variety of the prismatic crystal which is very frequently observed. These crystals, then, are not dependent upon the difference in proportion of ammonia in the two, but merely to the rapidity with which they are formed; nor is the stellar variety, as has been heretofore stated, indicative of a severer lesion than the other. We ourselves have never seen these stellæ already existing in urine at the time of emission, nor have we ever observed them to occur spontaneously.

The relation of these two forms of phosphate to one another seems a very interesting point in urinary pathology, and Dr Frick is of the opinion that many of the crystals found in this secretion, heretofore considered as differing from one another in their chemical composition, will be found a more accurate observation to be formed either by the aggregation or disintegration of primitive crystals.

II. MATERIA MEDICA AND MEDICAL THERAPEUTICS.

The Sumbul: a new Asiatic Remedy of great power against Nervous Disorders, Spasms of the Stomach, Cramp, Hysterical Affections, Paralysis of the Limbs, and Epilepsy; with an Account of its Physical, Chemical, and Medicinal Characters, and Specific Property of Checking the Progress of Collapse-Cholera, as first ascertained in Russia.

By A. B. Granville, M.D., F.R.S., of the Royal College of Physicians London, &c.

Pietro Della Valle, who travelled in 1623, 1624, and 1625, in various countries of Asia, has the following passage: "Since the Sombal di Cataio (Khatai or Cathay) is a root and not a spike, we may say that it was so named, because the word Sombol may signify, in a large acceptation, not only the plant, but the whole plant of any herb or blade which is sown; as the Arabic Vocabulary, entitled Kamus, appears to indicate." The passage to which the Roman traveller refers, Sir William Jones states, is this: "Sumbul," says the author of the Kamus, "is an odoriferous plant, the strongest of which is the *Sáré*, and the weakest the *Hindi;* but the Sumbul of *Rum* has the name of *Nardin*."

The name Sumbul is Arabic, and has been used in India and various adjoining countries to designate a plant or parts of a plant employed sometimes as a perfume, sometimes as incense in religious ceremonies, and sometimes as a medicinal agent. It is sometimes called Sumbul u'l Hind, which means merely Sumbul of Northern India.

Sir William Jones, who was desirous to ascertain what the Sumbul truly was, made it the subject of careful researches, according to the result of which, it appears that the *Sumbul* was a species of Valerian, known, however, among the Hindoos and Brahmins by the name of Jatamansi. The Booteans call it also Pampé.

In a dictionary of natural history, which a Moslem physician from Delhi showed Sir William Jones, Sumbul is mentioned in the following terms: "Sumbul means a spike or ear, and was called *Nard* by the Greeks. There are three sorts of Sumbul or Nardin; but when the word stands alone, it means the *Sumbul* of India, which is an herb without flower or fruit, (he speaks of the drug only) like the tail of an ermine or of a small weasel, but not quite so thick, and about the length of a finger. It is darkish, inclining to yellow, and very fragrant. It is brought from Hindustan, and its medicinal virtue lasts three years."

So far as it is possible to judge, Sir William Jones determined, beyond doubt, the true nature of this substance. 1. The dry *Jatámansi*, as sold in bazaars, corresponded perfectly with the description of the Sumbul. 2. One Moslem physician, who produced the authority of the Tohfatu'l Mumenin, a book of credit with the Moslems, brought, as a specimen of Sumbul, the same drug which the pundit of Sir W. Jones, also a physician, produced as a specimen of the Jatámánsi of the Hindoos. 3. Dr Roxburgh, who gave a botanical description of the plant from living specimens, and had drawings of them taken while writing the description, sent his Hindoo servant to one of the apothecaries' shops in Calcutta for a little *Jatamansi*, without saying anything. He brought several pieces of the identical drug which Dr Roxburgh was describing. Sir William Jones further ascertained that this plant is the *nardus* of Ptolemy, and the spikenard of the shops, or rather Indian spikenard of Dioscorides.

It is a mistake, however, to suppose that it grows in Hindustan. At least in the time of Sir W. Jones, it was not found in any part of India under the sway of the British. It appears that it is a native of Bootan and the mountains of Nepaul. In the time of Sir William Jones, though considerable quantities of Jatamansi, that is, the dried plant, were brought in caravans from Bootan (Butan), yet, by a law of the country, living plants cannot be exported without a license from the sovereign. In his time, ten plants were sent, upon application to the Devarajah, to Rangpoor. But the plants withered and died. The Bootan agents stated that it was principally esteemed for complaints in the bowels.

Dr Roxburgh examined the plant botanically, and he places it along

with the valerians, under the name of *Valeriana Jatamansi*, and agrees that the arguments of Sir W. Jones are conclusive.*

The account here given, which will serve as an introduction to the following abstract of the observations of Dr Granville, will show with little difficulty where the drug called *Sumbul* is to be obtained. Dr Granville and some of his friends sent for it, it appears, to St Petersburg, because there the Doctor saw it in use. In this city, however, it could only be obtained at second-hand. As the native country of the drug is Nepaul, and as the intercourse between this country and Calcutta and Madras is frequent, it is easy to see that the proper course is to obtain it directly from Nepaul. It is also not more difficult to obtain the substance from Bootan. In fact, it must be abundant in the bazaars at Calcutta.

Dr Granville supposes that the Sumbul has been hitherto nearly altogether unknown to the medical practitioners of Europe. This, however, is a mistake. Its existence was made known in 1790 to the Asiatic Society, by Sir William Jones and Dr Roxburgh; and it was not used by Europeans, only because they had no confidence in the accounts of its virtues given by the Hindu and Brahmin physicians. Within the last two years in some parts of the Continent it has acquired considerable celebrity, in consequence of its alleged value in the worst stages of CHOLERA. The physicians of Moscow and St Petersburg, who, from their greater proximity to the locality whence the drug is derived, were among the first to bring the Sumbul into use as a remedy against that terrible disorder, hesitate not to ascribe to its virtues the saving of thousands of lives during the late epidemic.

But previously to such an application of the drug, the Sumbul had been employed in Russia, as a stimulant and a rouser of animal energy in the advanced stages of malignant fevers (typhus), as well as in dysentery of an asthenic or debilitating character, not less than in chronic diarrhœa, with unquestionable success.

In a letter written from Kissingen to the Editor of the *Times*, and inserted in that Journal of the 8th August 1849, Dr Granville gave an account of the method of treating cholera in the civil and military hospitals of Moscow and St Petersburg, as witnessed by him, and which he showed, from the official returns of attacks, deaths, and recoveries, was more successful than any method adopted in this country. Of that method of treatment, the drug called SUMBUL was mentioned as one of the agents; and from the mode in which Dr Granville had recommended the drug, he expected, on his return to England, to find the Russian method and the Russian remedy in full operation.

In this expectation Dr Granville was disappointed. The new remedy was quite unknown, and long neglected both by physicians, practitioners, and druggists and chemists. Dr Pereira alone makes simple mention of it. Not discouraged by this neglect, Dr Granville has collected more information regarding the medicinal and therapeutic properties of the drug; and as he is satisfied that, both in the treatment of cholera and of analogous disorders, and some other affections of the nervous system, it possesses great and true therapeutic powers, and must consequently take rank in the materia medica of Europe, he therefore feels it to be his duty to explain the grounds on which this remedy is entitled to the confidence of physicians.

He further mentions that Mr Savory had procured some inferior specimens of Sumbul from St Petersburg, and some better ones from Hamburg at a considerable price; but received no information regarding it beyond that it was used in perfumery. In Heidelberg, also, Dr Granville found in the warehouse of an extensive importer of medicinal drugs a small quantity of Sumbul; but the specimens were old.

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* On the Spikenard of the Ancients, by Sir William Jones. Additional Remarks on the Spikenard of the Ancients, by Sir W. Jones. Asiatic Researches Vols. ii. and iv., and Works of Mr William Jones, by Lord Teignmouth, Vol. ii. p.9. London, 1799.

The Sumbul does not consist, as on a first appearance he fancied, and stated in his former announcement, of a mass of roots and leaves of a greenish plant bruised and pressed together. The mistake arose from his being shown at first, at St Petersburg, a mass of the substance which had been previously bruised together with the remains of a strong decoction of the same that had a greenish colour. The Sumbul, on the contrary, is a single, thick, homogeneous root, from two to three and even four inches diameter, circular sections of which, having a yellowish-white fibrous look, and from an inch to an inch and a half in depth, are brought into the Russian drug market at Moscow, through Kiatka, from the centre of Asia.

Bucharia, a district to the north of Mount Thibet, and part of the Mongol Empire, is considered by the botanists Erman and Von Ledebour to be the *habitat* of the plant which furnishes this root. Others, on the contrary, think it the produce of Trebisond, and not a few are inclined to ascribe to Persia the birthplace of the Sumbul. The latter individuals are people who deal in drugs.

The Nuremberg druggists, Hagen and Co., for example, believe the *habitat* of the original plant not to be known. They are disposed to consider Trebisond, Constantinople. and Nishni-Novgorod to be the most likely places from whence it is derived.

All these discrepancies of opinion among the wholesale drug merchants are easily reconcilable, and lead to the conclusion that their authority is not to be put in competition with, still less should it supersede, the deliberate opinion of botanists and travellers, such as those Dr Granville has alluded to in a preceding paragraph.

That some people should have deemed Persia to be the birth-place of the Sumbul is not surprising, seeing that the substance is much used in that country as a remedy against mephitic or depressing exhalations, especially in mines. We may equally explain the reason for the other opinion, which gives to Constantinople, Trebisond, or Nishni-Novgorod, the merit of producing the drug in question. These are places of export for all Asiatic produce, and there the Sumbul will ever be found on sale. This constant presence of the drug in those localities has induced drug merchants to imagine it to be one of their products, instead of being an importation.

Moreover, in Persia and in Constantinople, the use of perfumes such as the Sumbul possesses in an eminent degree, is in great vogue. Its employment, therefore, in these parts, for the purpose of extracting its perfume, may be very considerable, and would lead to the conclusion that the plant which yields the perfume itself is indigenous.

Dr Granville thinks that the root belongs to a plant of the umbelliferous family, probably an aquatic plant, or at least a lover of humid soils and the banks of rivers. When fresh, the root must be very considerable in size, inasmuch as, though it reaches us in its dried state and much compressed, yet it exhibits specimens of the thickness of four inches in diameter, some of which were in his possession. But these specimens vary in form as well as size, some of them assuming the shape of a tuberous, others of a fusiform root, without, however, any of the fibrils which accompany those kinds of roots. Dr Granville met with some samples which looked like the root of white hellebore in form; others, again, which had the appearance of being arranged in concentric circles.

In all specimens observed, the epidermis or external covering is generally dusky, or of a light brown; when of a darker colour it is a token of old age. The epidermis is very thin and much wrinkled. The inner substance is composed of coarse irregular fibres, which may be readily torn one from the other the moment the external covering is removed, and which constitute a porous texture, indicative of its aquatic dwelling.

When the root is denuded of its external coat, and cut transversely, we observe an external lamina, white and spotted, and an inner one much thicker, and yellow. Seen through a magnifying lens, translucid points may be discerned, which have the appearance of starch.

Two very striking and remarkable physical characters attract attentention when we examine this root;—first, its perfume, which as nearly as possible approaches to that of the purest musk; and, next, the powerful aroma it exhales in the mouth when masticated.

It was by some people slightly acquainted with the true characteristics of this substance, conjectured that the smell of musk was not inherent in the drug, but was a mere accession to it, from the drug having probably been packed in bales with other drugs from Asia, of which musk formed a part. But such a supposition is disproved, by the Sumbul retaining its musky odour, however old; by the fact that, when a specimen which has lost its original perfume is broken, the perfume immediately appears again from its interior; by the extraction of the said perfume from the root through chemical manipulation; and, lastly, by the name of *moschus-wurzel* which it has received from some of the continental botanists. This smell of musk is a distinguishing and permanent character in the drug, and readily adheres to the paper or other substance on which it has been laid, or otherwise put in contact with.

Nor is the taste less remarkable, although, in the dry state in which the root reaches Europe, a considerable portion of its sapid properties must have been lost. From the latter cause, no doubt, the taste is not very distinguishable at once. The first impression is that of a feeble sweetness, but this soon ceases, to be succeeded by another,—a balsamic impression on the tongue, followed by a bitterish taste by no means unpleasant. Presently, a sharp aroma, as we proceed with the mastication of the drug, develops itself throughout the mouth and throat, imparting a warm feeling to the mouth and fragrance to the breath. In its flavour, it reminds one of Angelica Root, which is the substance that most nearly resembles the Sumbul in some of its physical characters, though not in energy or medicinal properties.

The flavour of the Sumbul is of course greatly heightened by its solution in any spirit; and Mr Savory related to Dr Granville an anecdote of a medical man being made to taste a very few drops of its tincture, who after a few seconds expressed a lively apprehension lest he had taken something wrong, so potent was the gradual development of the stimulating aroma in his mouth. In not a few instances among Dr G.'s patients, and a few amateurs who wished to try the flavour of the ethereal tincture of Sumbul prepared by him, the same expressions of surprise at its peculiar impressions on the tongue were used.

But in this respect it is right to state that the peculiar aromatic flavour here mentioned in chewing the dry root, or its powder, varies considerably in certain specimens, those that appeared the oldest giving out much less of it than more recent specimens, and those brought by Dr Granville from St Petersburg much more than those he procured in Germany from Hamburgh; and yet he could not affirm that when converted into tinctures he could detect any material difference between the two kinds of specimens in regard to their balsamic and aromatized flavour.

The chemical analysis of the Sumbul has engaged the serious attention of two or three eminent organic chemists in Germany. Dr Reinsch Dr Schnitzlein, Dr Frichinger, and Kalthofer, may be mentioned as the principal investigators. Dr Granville briefly states the results of their labours, without, however, entering into the minutiæ of quantitative analysis, which for medicinal purposes are not in the least essential, but which would, on the contrary, embarrass the reader in his clearer understanding and appreciation of the subject.

According to Dr Reinsch's analysis, the Sumbul root contains, besides water, traces of an ethereal oil, two balsamic ingredients (resins), one of which is soluble in ether, the other in alcohol; also wax, aromatic spirit, and a bitter substance, soluble both in water and alcohol.

The solution of this bitter substance, when treated with lime and muriate of soda, throws down a sediment consisting of gum, starch, and saline matter.

The balsam seems more particularly to be the seat of the musk-like perfume, which comes out stronger and more distinctly by being wetted with water. Dissolved in ether, it resembles in appearance, consistency, and colour, the balsam of copaiva, and possesses a burning aromatic taste, with a faint, musk-like smell, which, however, is more largely developed by agitating the solution in water. By distillation it gives out a clear yellow peppermint-like tasting oil, having a greenish-white tint; in the retort there remains an indigo-blue coloured mass.

In some more recent experiments, Dr Reinsch obtained from seventeen ounces of the root an ounce and a half of the balsam, from which he extracted ten grains of a crystallizable acid, to which he has given the name of Sumbulic acid. There is good ground for considering this acid as analogous to Angelic acid, derived from Angelica root. By distilling the balsam, the same chemist procured first a yellowish, and secondly a greenish oil. The former, not unlike Cajeput oil, has a burning state, smells pleasant and peculiar, and is volatile and very combustible.

Dr Schnitzlein and Dr Frichinger studied together the chemical properties of the Sumbul root. They examined a beautiful sample of it, consisting of two ounces and six drachms in weight, from a section of the root three inches in diameter. On the cut surface, they found a tolerably porous membrane of white colour, incrusted with dirty yellow in which were discernible parts which, treated with sulphuric acid, become intensely purple. In other respects, they obtained precisely the same results as Dr Reinsch.

Kalthofer made several experiments also with the Sumbul, but more in a pharmaceutical sense. He found the alcoholic tincture to be of a yellowish colour, smelling like musk, and tasting like it as well as bitter. The ethereal solution is also yellow, tastes sharp on the tongue with a musk-like perfume. It then leaves behind in the mouth for some time a pungent balsamic taste, like that of the *Imperatoria* plant. By repeated decoction in water, he observed that the Sumbul throws down a precipitate, which has the appearance of wax.

By treating some of the root with the nitric acid of commerce, Mr Barnes, the manager of Mr Savory's laboratory, obtained, it is said, a considerable quantity of oxalic acid. Was this evolved or created by the action of the nitric acid? In other words, was it an educt or a product?

With some of the experiments made in Germany the experiments of Dr G. coincided. He found, for instance, that the alcoholic tincture is rendered thick by a mixture with water, and that the aqueous extract which is of a yellow brown colour, does not smell or taste like musk. The wax-like sediment Dr G. noticed in the strong decoction of the root; and he adds, that a mixture of an alcoholic and of an ethereal tincture does not, like the first of these, become thick upon being mixed with water.

It thus appears that the physical and sensible characters of this substance correspond and accord in a great measure with the chemical properties, as proved by analysis.

Looking to the very careful analysis already referred to by Dr Reinsch, the pharmaceutist would endeavour in the first place, to present to the prescribing physician out of this compound substance a solution of both balsams, the one requiring proof spirit, the other ether, and thus have two distinct tinctures. He would also separate the bitter extract, soluble in water, to be administered in the form of pills, while the two former would be used as drops, alone, or in combination with other appropriate substances. Following the same chemical analysis, Dr Granville recommends that the ethereal solution of the resinous substance should be made to yield, by distillation, the powerful aromatic oil mentioned by Reinsch and others, to be employed as hereafter to be stated. Lastly, he adds, that a third or compound tincture can be advantageously formed, by mixing two parts of the alcoholic with one part of the ethereal solution.

But, besides these several officinal preparations, and the extemporaneous one by decoction or infusion, or both, he thinks there is every reason for believing that the powdered root, made into the form of pills, or a certain quantity of the fibres of the root masticated, and the saliva swallowed, will prove useful modes of administering this medicine, wherever its prolonged employment is deemed necessary for the cure of certain chronic complaints, in which the Sumbul is indicated.

Speaking, therefore, pharmaceutically, we have the following preparations of the Sumbul equally available in medicine at the discretion of the physician:—1. The root itself masticated. 2. Its impalpable powder, taken as such or in the form of pills. 3. Its infusion in cold water. 4. Its decoction. 5. An aqueous or bitter extract. 6. An alcoholic tincture. 7. An ethereal tincture. 8. A compound tincture. Lastly, An ethereal volatile oil.

The diseases in which this drug has been recommended and employed with success are—

1st, What are commonly called nervous disorders, a very comprehensive class, for which, *à priori*, one would expect such a substance as the Sumbul to be eminently useful.
2dly, Spasms of the stomach, and cramp.
3dly, Hysteria, and all the varieties of hysterical affections.
4thly, Chlorosis, amenorrhœa, and dysmenorrhœa.
5thly, Paralysis of the limbs.
6thly, Epilepsy.
7thly, The collapse stage of cholera.

1. It will immediately strike every reader, that the nervous system seems to be the constituent part of the human frame most susceptible of the action of this new remedy, for, of the seven classes of disorders here enumerated, five concern entirely and distinctly the nerves of our body. This was to be expected, considering the great and diffusible energy of some of the principal constituents of the Sumbul, its stimulating qualities, and the fragrance and volatility of its more ethereal principles. It was this last consideration, doubtless, that first suggested its employment in the same complaints for which an analogous remedy, the *Angelica* root and *Imperatoria* (*Masterwort*), has been known of old to have been employed with a fair share of success.

Dr Reinsch states that in nervous atrophy its efficacy is undoubted; in low or nervous fevers succeeding typhus, Dr Tillman and Dr Richter have employed it for the last three or four years with very marked benefit; while Dr Martiny of Darmstadt has found it beneficial in all those cases of dropsy which depend on impaired nervous orgasm.

2. Dr Granville, within the last few months, employed the Sumbul, sometimes with one, and sometimes with another, of its preparations, with immediate benefit, in cases of severe spasms of the stomach, whether arising from flatulency, (the prolific parent of many painful disorders and sensations,) or from actual cramp in its muscular coats, dependent on nervous irritation, or what the French call "crispation des nerfs." In the case of an elderly lady, who for many successive weeks had been liable to what she used to call "bursts of wind" in the stomach, waking her in the middle of the night, the employment of the Sumbul, under the form of the compound ethereal tincture, taken at the moment, with the view to relieve present sufferings, and in the form of powder, as a progressive remedy afterwards, completed the cure in a short time. He has likewise observed an almost instantaneous relief, in an attack of cramp in the stomach, from taking a number of drops of the compound ethereal tincture on a lump or two of sugar. This is the best vehicle, in his opinion, for the extemporaneous administration of this remedy upon any sudden emergency.

3. But the third class of disease is the one, in the treatment of which Dr Granville found the various preparations of the Sumbul most efficacious. One very recent case, indeed, of regular hysteria, attended with what the patient styled *corkscrew* pains in the left region of the uterus and its appendages, which had long baffled the skill of medical attendants, has afforded me an almost miraculous proof of the efficacy of the Sumbul in hysterical and uterine affections, as the painful sensations subsided very quickly, and finally gave way, to all appearance altogether, in a comparatively short period.

Dr Granville mentions a case of hysterical pain, or spasm (as the mother of the patient calls it), in a young lady, who bore, for more than a year, a gathering or abscess at the head of the psoas muscle, in the right hip, which an eminent city surgeon had not deemed necessary to open, and which broke of itself after repeated applications of poultices under my direction, discharging a very large quantity of matter. The extension of the latter down the psoas muscle probably produced irritation of the pelvic and uterine nerves, and had given rise to the hysterical or spasmodic attacks alluded to. He directed a number of drops to be given, two or three times a day, of the tincture of Sumbul, and he expects to hear of its having allayed the distressing symptom. The patient is at that age when the derangement of another important function would follow these spasms, should not the Sumbul succeed in removing them

4. This leads him to speak of the complaints enumerated under the fourth class, which seem to afford a very fair field for trying the different preparations of the Sumbul. His experience, in this respect, is limited to one or two cases—and of course no one else in this country can be quoted as having had any. Accustomed, during many years of obstetrical practice, to view these disorders as not purely nervous, but rather as the effect of congestion and local inflammation, producing those singular results which he described in a former work, he is not inclined hastily to employ diffusible stimuli or energetic excitants, as have been generally recommended in such complaints; but where torpor or manifest atony of the nervous power exists, he recommends the use of any suitable preparation of the remedy now under consideration. In the two cases alluded to, the one occurring in a married lady who had suffered much from dysmenorrhœa, which was evidently the cause of her low standard of health since her marriage, as well as of her having no children, the decoction administered once a day only, and the compound

tincture drops every night, in a little milk, accomplished a perfect cure of the disease. The other case was one of chlorosis in a pale and sallow-faced young woman, indolent of habit, highly nervous, fanciful in her appetite, and hardly ever regular. Here Dr Granville gave the ethereal tincture, as the most appropriate preparation for the complaint, in almost homœopathic doses, and the result promises to be most satisfactory, inasmuch as there has been an evident improvement for the last two months.

5, 6. Concerning the disease named in the fifth class, and again in epilepsy, Dr Granville thinks it sufficient to lay down the following rule. As the right employment of the remedy itself requires that we should distinguish the *species*, as it were, of paralysis and epilepsy, to be treated, it is not a matter of choice, but of necessity, that we never ought to employ the preparations of Sumbul, in either the one or the other, so long as there is any reason for suspecting the continued presence of vascular fulness (congestion), or of inflammation in the cerebellum or any portion of the spinal marrow, the first occurrence of either of which, or of both, was the cause of the original paralytic stroke or of the first epileptic fit.

It is well observed by Portal, that almost all the alleged remedies against epilepsy are calculated to protract, and even to increase, rather than alleviate or cure, the disease; for they all assume that the nervous cords are unstrung, and require to be wound up and stimulated; whereas the real fact is, that the disease continues, or is persisting, because the same state of the fulness of the blood vessels and pressure by them on the cerebral or spinal matter which first occasioned the disease, *are persisting.*

The having lost sight of this doctrine has been the cause of infinite mischief. Hardly any distinction has been made between such a condition of things, in the majority of cases of epilepsy which require local depletion or the abstraction of blood, and that other condition of the disease which demands the use of the most energetic rousers of neurolism. When the latter obtains, the double tincture of Sumbul will be found of immense efficacy; but it requires care, and management, and perseverance, and it will be found to leave almost all the pre-eulogized heroic anti-epileptic remedies behind.

Dr Granville infers from various well-established facts that sudden deaths among persons in the better ranks, between the ages of forty and seventy, are very frequent; and, assuming this to be the fact, he ascribes it to the error of regarding cases of paralyzed limbs as the mere result of weakness, and not of irritation and congestion of the nervous system. To these cases, which are too often treated by tonics, chalybeates, bitters, good living, wine, and the other accompaniments, he thinks that the use of Sumbul in powder is much better suited. Sometimes a little of the tincture, and sometimes the ethereal solution, may be used; but the most eligible constant general remedy, he maintains, is the powder of Sumbul.

7. *Sumbul in Cholera.*—In the space of six months and three weeks, in 1848,—that is, from the 4th of June to the 31st of December,—22,022 individuals, out of a population of 445,000, were attacked with cholera, at St Petersburg, of whom 12,228 died; and at Moscow, between the 17th of March and the 14th of December, of the same year, in a population of 353,133, the attacks of cholera were 16,248, of which number 8025 ended in death. In the whole empire of Russia, during the same year, 1,686,849 were attacked by the disease, 668,012 of which proved fatal cases. There had been, therefore, 32,439 persons attacked with cholera every week during that year, of whom 12,846 died in the same time.

With such dismal statistics before them, officially announced in a report to the Minister of the Interior, it was to be expected that Russ medical men would apply themselves to the discovery of some better mode of treating that dreadful malady. This was done in 1848. Si- multaneously with this research, an inquiry was instituted, in lar hospitals and at the Academy of Medicine, into the pathology of disease. Lastly, a more accurate description of the real genuine Asi cholera was drawn up from the careful and combined observations eminent physicans. Unfortunately their field for observation was tensive, and they availed themselves of it.

While the inquiry into the seat and the real nature of the compla was confided to the celebrated anatomist, Pirogoff,—who, I observe recent number of the *St Petersburg Journal*, has very lately publishe an "Atlas of the Pathological Anatomy of Cholera, in sevent Coloured Plates, with a Text,"—the merit of finding out a better mo of treatment devolved on Dr Tillmann, chief physician to the very tensive civil hospital of Petro-Paulowsky, in St Petersburg.

Reasoning from the result of upwards of five hundred *post-mor* examinations (some of which Dr Granville witnessed during his visit to that capital), Pirogoff came to the conclusion that there are distinct seats of the disease:—1st, the intestinal canal; and 2dly, lungs; and he has further observed two kinds of intestinal cholera— *simple* and the *mixed*—each offering different pathological lesions the mucous membrane of the intestines.

On the other hand, very able physicians,—such as Arendt, Tillman Pellican, Rheinfeldt, Avenarius, &c.—whilst watching the very onset of the disorder, its suddenness of invasion in individuals who not ailed anything before, and the number of people brought into hospitals out of the streets, where they had dropped down as if stru by a head-blow, had remarked that the suspension of the vital functi partook more of the character of that which is observed in asphyxia, drowning, and came to the conclusion, that in all such cases (and th have been the most numerous, as well as the most formidable in al epidemics of cholera) the treatment ought to be the same as is use those emergencies. They accordingly recommended, 1st, a quick storation of animal heat; 2dly, an energetic remedy that should and keep the heart in full action, even to the risk of producing cere excitement; 3dly, bleeding, if, by the two preceding means, such a reaction should be produced as to give rise to head symptoms. application of these views in practice Dr Granville witnessed on spot himself, and it was followed by success.

Sumbul may be given in substance, but it is more generally employ in the form of decoction or infusion, by spoonfuls frequently ministered. Its power, however, in the way of reanimating the energies of a collapsed patient, has been found such as to demand caution, lest it should produce cerebral excitement, and thence a typh fever,—a consequence that has often been witnessed in the R hospitals subsequently to the recovery from the first or more danger stage of cholera.

On Tic Douloureux and Painful Affections of the Nerves; with gestions for the Treatment by means of the Aneuralgicon. Illustr by numerous Cases and an Engraving of the Apparatus. By TOOGOOD DOWNING, M.D., M.R.C.S., &c. London 1849. pp. 73.

Tic Douloureux, or Neuralgia, Dr Downing distinguishes Rheumatic Neuralgia, Rheumatism, *Neuritis*, Odontalgia, Hemicr Disease of the Antrum, and Frontal Ague.

Allowing that the proximate cause is involved in obscurity, he tinguishes the remote causes into the Distant and the Local; or those influencing the nerve by its sympathy with a distant organ, and those acting directly upon the nerve itself. Among the former should be placed derangement of the stomach and bowels, the presence of irritating matters in the *primæ viæ*, hæmorrhoids, strictures, and worms. Changes of temperature are fruitful sources of neuralgic pains. Many physicians believe that the great mass of cases arises from exposure to cold. This will be readily understood by those who consider how closely allied neuralgia is to inflammation and rheumatism, and what a shock the exposed nerves of the face must sustain when exposed to a snow storm, when the body is heated. Extreme heat the author has found to be nearly equally productive of facial neuralgia. Of all domestic servants, cooks are most frequently troubled with it. The irritability and red face of a cook are proverbial. Disease and preternatural growth of bone must now, doubtless, also be regarded as occasional exciting causes of tic douloureux. (*See the case of Mrs M.*) Sometimes it may originate also in disease of the brain. Although the notion has given rise to much abuse, caries of the teeth should by no means be disregarded as an exciting cause. Neither should we overlook the influence of malaria.

Various local agents, such as blows, cicatrices, tumours, spiculæ of bone, should be regarded as efficient exciting causes of this Protean malady. Dr D., in short, concludes, that there has always existed some local agent, to determine to the part the neuralgic irritation.

The principles of treatment resolve themselves into three chief indications:—1st, To remove the predisposing and exciting causes; 2d, to avoid all possible sources of irritation; 3d, to allay the morbid excitability of the nerves affected.

Removal of Causes.—Upon the removal of the cause, a complaint generally ceases spontaneously; the *vis medicatrix naturæ* completes the cure. This is not always the case with neuralgia; it is sometimes an exception to the general rule. Still, the cause or causes of tic douloureux should be sought after most diligently. Unfortunately, they cannot always, or even often, be discovered. In some rare instances, they cannot be removed, even when found out. Yet is our duty, in the first place, to search for them. Our inquiries should be conducted with the greatest care and minuteness.

In the first place, we should search, in the immediate vicinity of the neuralgic focus, for the local exciting cause; and failing in discovering it, after the most rigid examination, we should extend our inquiries to more distant parts of the body. The state of the abdominal viscera and digestive functions should, undoubtedly, here claim especial attention. In the same way, careful inquiry should be made as to the presence of hæmorrhoids, stricture of the urethra, disease or derangement of the uterus, and leucorrhœa. Upon the removal of such sources of irritation, the disease will possibly be much mitigated in severity, and rendered more amenable to other treatment.

The second indication of treatment—namely, *to avoid all* the usual *causes of irritation*, is obvious to common sense, yet often disregarded. Some persons, for instance, while under treatment for neuralgic pains, expose themselves to cold winds, and eat rich pastry, although these are among the best recognised excitants of the disease. They will submit to any remedy, however painful or disagreeable, rather than abandon their usual habits.

The third indication in the treatment of tic douloureux, is—

To allay the morbid excitability of the nerves affected. This may appear, at first sight, to comprehend the whole treatment; but upon a little consideration will be found not to do so,—at least, not in all cases.

The removal of the cause will sometimes effect a cure. That, and attention to the general health, will often do so. But there are numerous other instances,—indeed, the greater number,—where the disease is not so easily disposed of. The great mass of cases of tic douloureux consists of—1st, those in which no obvious cause can be discovered; 2d, those where a sufficient exciting cause can be detected, but cannot be removed, either from its irremediable nature, or from the obstinacy of the patient; 3d, those wherein the irritability of the nerve continues after the removal of the cause.

What are the resources of art in such cases of confirmed neuralgia? They are manifold.

There is scarcely a drug in or out of the materia medica that has not been used in the treatment of this painful affection. Some of these have maintained a high reputation, and been vaunted as *specifics*. Yet there is no real panacea for tic douloureux. There is no one drug that will cure all cases, or even the majority of cases. Yet it cannot be doubted that several of these remedies are potent, and have been, occasionally essentially serviceable.

They may be divided into the *general* and *local*; or those which act upon the disordered nerve by means of an impression made on the system, and such as, being applied directly to the part, allay at once the topical irritation. Each class has been found pretty nearly equal in efficacy. From his ideas of the essential nature of neuralgia, Dr Downing thinks that local applications have been too much slighted. Although he by no means trusts to them alone, yet it seems to him that they may always be combined with general remedies with the greatest advantage. "For this purpose," he says, "and with these views, I invented the *Aneuralgicon.* With it alone, as I shall presently show, I have cured several cases of obstinate tic douloureux, and, when employed in conjunction with general remedies, the disease has yielded although it resisted obstinately the latter by themselves. The most powerful of the specific *general* remedies for tic douloureux are,—carbonate of iron, disulphate of quinine, bark, arsenic, croton-oil, zinc, belladonna, henbane, nux vomica and strychnine, stramonium, aconite, cannabis indica, and the hydrocyanic acid: ether and chloroform should also be added to the number."

The *local* means at our disposal are various at the present day. They comprise blisters, the application of a strong solution of ammonia, and the moxa; stimulating ointments of the biniodide of mercury, and sedative unguents of the vegetable alkaloids. Next comes the *endermic* method of cure, consisting of the application of morphia, veratria, &c. to a blistered surface, or the still more recent *inoculation* of powerful drugs. Finally, he adverts to the practice of *dividing the nerve*, as a plan which is totally inapplicable to a great majority of cases.

These are the most approved weapons with which it has been usual to combat the enemy. It cannot be denied that sometimes one, sometimes another, has been employed with success. They are each, occasionally, of signal service. But still the great and discouraging fact remains that in numberless instances they are utterly useless. They do not, as the saying is, touch the complaint. There are hundreds of persons now writhing in all the agony of tic douloureux, who have given a fair trial to nearly, perhaps quite, all these remedies, and numberless others. In illustration of the inefficacy of the most powerful and highly-prized of these specifics in certain cases, it may be mentioned, that a gentleman submitted without avail to the division of several of the nerves of the face, while a lady swallowed no less than *twenty-seven pounds* of the carbonate of iron, and yet died the victim of neuralgia. Some more certain plan of treatment is required.

From considering tic douloureux as often a local disease, depending on a state of excessive irritability, sensibility, or spasm of a particular nerve, and observing the effect of topical sedatives, Dr Downing was led to the conclusion, that the most direct way of quieting this state was by the application of *warmth and sedative vapour*,—something to soothe the nerves and calm them into regular action. For this purpose Dr Downing contrived the Aneuralgicon, and it appears to answer the purpose. The following explanation is given.

Description of the Aneuralgicon.

The Aneuralgicon is a name (compounded of *α-νευρα-αλγος*) applied to an instrument used by me for the purpose of allaying pain in nerves. It is a kind of fumigating apparatus, in which dried herbs are burnt, and the heated vapour directed to any part of the body.

It is extremely simple in construction, and consists essentially of three parts, with their media of connection,—a *cylinder*, for igniting the vegetable matter; *bellows*, for maintaining a current of air through the burning material; and *tubes* and *cones* for directing the stream of vapour.

The *cylinder* is a silver vessel, of a cylindrical shape, about two inches in length, and one inch in diameter. It has a metallic plate at the lower part, perforated with many holes, on which the burning materials lie. Beneath this is an opening for the admission of air, and a socket into which an ivory handle is made to screw. The dome-shaped lid, fitting accurately to the top of the vessel, allows the vapour to escape through an orifice and tube at the summit.

The *bellows* consists of two plates of mahogany, of an oval shape, and about eight or nine inches in length. These are joined together by thin leather, maintained in its proper position by ribs at suitable distances. A strong spring is fixed in the interior, to keep the plates apart, and react against the pressure of the hand. A socket to hold the *ivory handle* of the cylinder is fixed upon the upper plate, and a strong strap and buckle to fasten the bellows together, when required for transport. The lower plate contains the valve, at the posterior part, for the admission of air, and the nozzle, at the anterior extremity, to afford it exit. A stout tube of vulcanised India-rubber, about a yard long, connects the nozzle of the bellows with the lower orifice of the cylinder.

It will be seen from this description, that when these parts are united, and pressure is made on the upper plate of the air-vessel with the hand, a current of air passes through the nozzle of the bellows, along the caoutchouc tube into the cylinder, and from thence escapes from the orifice at the top. So when any prepared vegetable material is put into the cylinder and ignited, a stream of warm or hot vapour will pass out in the same direction.

The arrangements for applying this current are varied. One small *silver tube* gradually tapers to a point, and is employed to inject the *meatus auditorius*, and other passages; another is curved at the end for application to cavities and points of the mouth and palate; a third, made of elastic material, is considerably larger and longer.

In order to apply the vapour with advantage to a *surface*, cones of various sizes have been constructed. These are tubes, shaped like extinguishers, covered with leather, and lined with sheet lead. By this arrangement they retain the shape given them by the hand. These tubes and cones are, of course, adapted to the orifice at the upper part of the cylinder. In consequence of the length and flexibility of the caoutchouc tube connecting the bellows and cylinder, readiness of application to all parts of the body is insured.

The materials used in the aneuralgicon are chiefly the leaves, slender stalks, and seeds of plants. After carefully selecting the herbs, to ascertain their genuineness and purity, they are thoroughly dried by a gentle heat. Each leaf, if it be a large one, is then taken separately and rubbed between the hands, so as to break up the parenchyma into small fragments, from which all stalks and woody fibre should be excluded. Some roughly powdered cascarilla bark may then be added with advantage.

The plants chiefly employed by Dr Downing have been those of the belladonna, henbane, cannabis indica or Indian hemp, tobacco, aconite, stramonium, hemlock, savine, digitalis, and a few others. The seeds of henbane, colchicum, and cannabis have also been added, under certain circumstances.

The chief medicinal effects observed in the use of this instrument are those of a sedative character. But the remedial influence of the aneuralgicon is not alone confined to the use of certain herbs. A considerable power is attributable to the warmth or intense heat generated. When the vegetable matter is ignited, and a current of air is made to pass through the burning mass, a small or great degree of heat can be produced at pleasure. Thus, when the hand is gently pressed upon the bellows, a mild, warm stream of vapour is poured forth, which may serve as a douche to tender parts. But by strongly and rapidly compressing the same receptacle, the fire within the cylinder is urged, like that of a smith's forge, and the blast is intensely hot and burning. In this way any degree of rubefaction may be effected on a large or small surface; and by gradually augmenting the temperature, no bad substitute for the moxa is obtained. Thus we have in this aneurodyne apparatus the effects of heat and of medicated vapour; and each of these may be obtained singly, or combined together in regulated proportion.

In allaying the pain dependent on excessive irritability and excitability of particular nervous fibrils, the aneuralgicon will be found a most valuable auxiliary, sometimes a direct thereapeutic agent. The effects of both gentle heat and sedative vapour combine to produce the cure.

Dr Downing speaks with more confidence of the power of this instrument in removing the painful affections of nerves, as he has now tried it in a considerable number of cases. It was from observing the benefit afforded in certain instances of such distressing maladies that he named it the aneuralgicon, or pain-assuager. In obstinate facial neuralgia, or tic douloureux of many years' continuance, which had resisted every other kind of treatment,—that is, the ordinary routine remedies,—he has more than once been fortunate enough to cure the complaint in one or two sittings; several times by a few applications. And this without giving the patient any internal remedy. More often he has employed it as a local adjuvant of the approved resources of medicine. And this he has observed, that when the administration of drugs by the stomach, in full and persevering doses, has failed altogether in producing a specific effect in allaying the local nervous excitement, the combined auxiliary use of the aneuralgicon has brought about a speedy cure.

Although most sanguine about the inflence of this aneurodyne apparatus in treating facial tic douloureux, he has, contrary to expectation, found it available in neuralgia of other parts of the body. Thus many cases of sciatica have readily yielded to the application.

There are many other complaints that have more or less affinity to true tic douloureux, and which, in fact, can frequently scarcely be distinguished from it that may be benefited by the same means, used with judgment. He refers more particularly to rheumatism of the scalp, hemicrania, *clavus hystericus*, and painful affections of the jaws; and to the cold kind of rheumatism, which is relieved by the application of heat, seated in various parts of the body. A stream of warm sedative vapour, poured into the external opening of the ear by means of the aneuralgicon, will often allay immediately the pain of otalgia. I have found it very serviceable in certain cases of nervous deafness, depending on excessive irritability of the parts; and its power of restoring a deficient secretion of cerumen is very great.

It should, however, be understood, that he by no means proposes the aneuralgicon as an infallible specific for neuralgia, or pretend that it is applicable to all cases. Some discrimination and management will be required, and then, he believes, it will often be found to act *as a charm*, and generally serve as a useful auxiliary. The cause of the nervous excitement must be diligently sought after and removed; but in cases where this cannot be discovered, or, when found, cannot be dislodged, the pain may still frequently be effectually and even permanently allayed. It is satisfactory to add, that *no ill effect has ever followed its use.*

Among the numerous cases of tic douloureux, sciatica, &c. that have been treated by Dr Downing, the following is selected in illustration of the beneficial employment of the aneuralgicon :—

CASE. *Tic Douloureux.*—Mrs M. came under my notice on the 18th July 1848. She is a married woman, eight-and-twenty years of age, residing in Ferry Street, Lambeth. Has been always weakly and delicate, subject to leucorrhœa and aphthæ; but has still borne five children to her husband. Had one tooth drawn when sixteen years of age; but more have since been extracted, in consequence of caries, arising from medicines taken and applications made to the face, to alleviate the pain of neuralgia. The origin of the tic douloureux in this case is clear and satisfactory.

About six years ago, a friend sent her as a present, the *chop of a bear.* After eating this delicacy, she was picking the bone, when she fancied a little splinter of it ran into her jaw, on the upper part of the right side, just beyond the teeth. Most probably a tooth was broken, or the alveolar process injured. Be this as it may, immediately afterwards she says she felt a numbness and disagreeable sensation on both sides of the face. This subsequently subsided on the left side, but continued unabated on the right.

Two or three days after the accident, *great pain* came upon the right *side of the face*, extending from the lower jaw to the eye, and *accompanied* with *dribbling of saliva.* This continued for two years, with only slight intervals of rest.

The agony,—which the patient describes as excruciating, at times occupying the whole side of the head and face, and even extending down the neck,—was so great that she sometimes became raving, and her friends were obliged to have her strapped down in bed. Tried everything she could think of, to afford relief from the pain, and procure sleep. Took half a bottle of brandy sometimes on going to bed, and all kinds of sleeping draughts, with opium and morphia.

Mrs M. at this time lived in Frith Street, Soho, and was under the care of several eminent practitioners. A great number of medical men, according to her account, prescribed for her at various times. She remembers that full six-and-twenty blisters were applied, among other plans of treatment, to parts of her body;—the face, back of the neck, and the arm from the elbow to the shoulder. Morphia was frequently sprinkled over the blistered surface, and the sores were kept open for a considerable time. Very little, even temporary relief, followed.

Her funds being now well nigh exhausted by feeing the doctors, Mrs M. became an out-patient at the Middlesex Hospital. From thence she went to the Westminster, and her torment still continuing, she was received into the University College Hospital, under the care of Dr Williams. This must have been about three years ago.

At this time the character of the pain had altered considerably. It was now *periodic*. It would tease a little all the day long, but about two or three o'clock in the morning it would come on awfully. Its disease now yielded to treatment that had often been tried before without effect. Dr Williams, she says, gave her tonic medicine, and prescribed generous diet, exercise, and amusement. Under this judicious management she greatly improved, so that she was able to leave the institution.

Mrs M. continued nearly well, until she became in the family-way in March twelvemonth last (1847). The account she gives of this attack is as follows:—Two or three months after she found herself pregnant, a little blister appeared on the palate, and subsequently a fistulous opening showed itself. Soon afterwards, she says, she felt a little bit of something protrude from the orifice. This she gradually pushed back to the side of the jaw, and she fancies it is there now, lying loose under the mucous membrane. As soon as she had, as she imagined, pushed this body back, she felt the pain come on excruciatingly. It was exactly as on the previous occasion. The agony *has continued ever since*. Nothing seems to quiet it. The treatment that was so successful before now affords no alleviation.

Mrs M. was brought to me on the 18th of July 1848, by Mr Earles, a gentleman practising, I believe, in the Wandsworth Road. I made a careful examination of the face and jaws. There was no swelling or disfigurement externally. Upon opening the mouth, I at once perceived a large hole in the palatal plate of the superior maxillary bone of the left side. When a probe was introduced through this opening, it grated distinctly against denuded osseous matter. The edge of the palate bone on the right side was enlarged, but I could detect no loose bone beneath the lining membrane, as the patient intimated. The remaining teeth were sound, and the gums healthy. She was worn to a shadow with suffering.

Mr Earles and I took the patient into King's College Hospital, to have the benefit of the opinion of Mr Fergusson. That gentleman pronounced the vomer bone to be necrosed, and advised that nothing should be done until the bone became loose. He could suggest nothing for the neuralgia.

On the 19th July, Mrs M. came to my house, accompanied by Mr Earles. She was then suffering the greatest agony. The pain seemed to originate in the second division of the fifth pair of nerves, but also occupied branches of the first and third portions. The facial nerve was also apparently implicated. She described the pain as darting, stabbing—as if knives were run into her. There was always a dull, aching pain deep in the cheek and on the palate; but occasional exacerbations of intense suffering, extending from thence over the cheek, lower jaw, backwards to the ear, and upwards to the temple, and side of the head. These paroxysms came on at uncertain intervals; there was no distinct periodicity; the slightest cause would bring them on; they generally lasted from ten minutes to an hour or more. There was no swelling of the side of the face, neither was any increase of temperature observable. Pressure over the seat of pain seemed neither to increase nor diminish the suffering. She described a sensation of stiffness of the skin of the scalp and face of the affected side, and a sense of soreness when closing the eye. General health good. No disturbance of the bowels. Appetite moderate. Tongue clean, but rather whiter on the right side. Sleeps well when undisturbed by her tormentor.

Here the exciting cause of the tic douloureux was plainly apparent. It evidently depended on irritation of the superior maxillary nerve by diseased bone. The trunk of that nerve may also have been in a of chronic inflammation from the same cause. *This cause could not be removed.*

Under these unpromising circumstances, I determined to try to allay the nervous excitement by an application to the part; for all internal remedies had been previously used without effect. I employed the aneuralgicon. I directed a stream of warm medicated vapour to the side of the head and face, into the *meatus auditorius* and, by means of a curved tube, into the fistulous opening in the palate. This was continued for a quarter of an hour. I carefully watched the effect.

In a few minutes, my patient said that the stiffness of the skin, before alluded to, was leaving her. Gradually a dulness, or numbness, spread over the side of the face. Ultimately drowsiness and faintness came on, with nausea, until she went off into a slight coma, during which the pupils were dilated, especially that on the right side. Mrs M. was then removed to a sofa, and in a few minutes recovered her consciousness. *All pain was gone.*

July 20th.—The tic douloureux has scarcely, if at all, appeared since the last operation. Repeated the use of the aneuralgicon, but not to so great an extent. The same effects followed, but in a mitigated degree.

22d.—Has had no return of the pain.

26th.—No return of the neuralgia.

Aug. 20th.—I hear, through Mr Earles, that Mrs M. has been perfectly free from tic douloureux since she submitted to the operation.

I have met this gentleman since, very lately, and he assures me that she still continues in the same happy condition. Cured.

That Mrs M. will be free from attacks in future is more than I do, or have a right to, expect. Such an obvious and powerful exciting cause existing, it is only a source of wonder to myself that she should have remained so long without a return of the paroxysms. A temporary relief was all I anticipated, and the permanent benefit was equally unhoped for and satisfactory.

Other ten cases are subjoined, and two of rheumatic neuralgia, all cured by the local application of the vapour of anodyne and narcotic herbs by means of the ANEURALGICON. The remedy and the mode of treatment appears to have been highly efficacious in the hands of Dr Downing; and his success ought to induce others to have recourse to a means which promises relief in a disease so painful, and so often resisting the effect of remedies. It may not be universally successful; but, combined with other constitutional remedies, it may place the patient in the way of recovery.

III. SURGERY.

Case in which an Iron Rod is believed to have passed through the Skull, touching and wounding the Brain, yet terminating in Recovery. By HENRY J. BIGELOW, M.D., Professor of Surgery in Harvard University.

The following case occurred in the practice of Dr J. M. Harlow of Cavendish, Vermont. Having received a verbal account of the accident, a few days after its occurrence, from a medical gentleman who had examined the patient, I thus became incidentally interested in it; and having since had an opportunity, through the politeness of Dr Harlow, of observing the patient, who remained in Boston a number of weeks under my charge, I have been able to satisfy myself as well of the occurrence and extent of the injury as of the manner of its infliction. I am also indebted to the same gentleman for procuring at my request the testimony of a number of persons who were cognizant of the accident or its sequel.

Those who are skeptical in admitting the co-existence of a lesi grave, with an inconsiderable disturbance of function, will be inter in further details connected with the case; while it is due to the that a more complete record should be made of the history of s markable an injury.

The accident occurred upon the line of the Rutland and Bur Railroad, on the 13th of September, 1848. The subject of it, Phi P. Gage, is of middle stature, twenty-five years of age, shrewd and in telligent. According to his own statement, he was charging wi powder a hole drilled in a rock, for the purpose of blasting. It appe that it is customary in filling the hole to cover the powder with sa In this case, the charge having been adjusted, Mr Gage directed h assistant to pour in the sand; and at the interval of a few seconds, h head being averted, and supposing the sand to have been prop placed, he dropped the head of the iron as usual upon the charge consolidate or "tamp it in." The assistant had failed to obey th order, and the iron striking fire upon the rock, the uncovered pow was ignited and the explosion took place. Mr Gage was at this ti standing above the hole, leaning forward, with his face slightly avert and the bar of iron was projected directly upwards in a line of its a passing completely through his head and high into the air. The wou thus received, and which is more fully described in the sequel, w oblique, traversing the cranium in a straight line from the angle of lower jaw on one side to the centre of the frontal bone above, near sagittal suture, where the missile emerged; and the iron thus forc thrown into the air, was picked up at a distance of some rods from patient, smeared with brains and blood.

From this extraordinary lesion the patient has quite recovered in h faculties of body and mind, with the loss only of the sight of *the* i jured eye.

The iron which thus traversed the skull weighs thirteen pound and a quarter. It is three feet seven inches in length, and *one* inc and a quarter in diameter. The end which entered first is pointe the taper being seven inches long, and the diameter of the point on quarter of an inch,—circumstances to which the patient, perhaps, owe his life. The iron is unlike any other, and was made by a neighbouri blacksmith to please the fancy of the owner.

Dr Harlow, in the account above alluded to, states that "immediate after the explosion the patient was thrown upon his back, and gave few convulsive motions of the extremities, but spoke in a few minute His men (with whom he was a great favourite) took him in their arm and carried him to the road, only a few rods distant, and sat him int an ox cart, in which he rode, sitting erect, full three quarters of a mil to the hotel of Mr Joseph Adams, in this village. He got out of the cart himself, and, with a little assistance, walked up a long flight stairs, into the hall, where he was dressed.

Mr Joseph Adams states that Mr Gage rode to the house, three-quar ters of a mile, sitting in a cart, and walked from the cart into the piazz and thence up stairs, with but little assistance. Mr Adams noticed the state of the left eye, and knew, from experiment, that he could see with it for several days, though not distinctly. In regard to the elevated appearance of the wound, and the introduction of the finger into it, he could fully confirm the certificate of his nephew, Washington Adams and others, and adds, that he repeatedly saw him eject matter from the mouth similar in appearance to that discharged from the head. The morning subsequent to the accident, he went in quest of the bar, and found it at a smith's sho [illegible] it in which he was engaged.

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The men in his pit asserted that "they found the iron, covered wit

blood and brains," several rods behind where Mr Gage stood, and that they washed it in the brook, and returned it with the other tools; which representation was fully corroborated by the greasy feel and look of the iron, and the *fragments* of *brain* which he SAW upon the rock where it fell.

The Rev. Joseph Freeman went to the place where the accident happened, soon after its occurrence. He found upon the rocks, where he supposed he had fallen, a small quantity of brains. There being no person at this place, he passed on to a blacksmith's shop, a few rods beyond, in and about which a number of Irishmen were collected. As he came up to them, they pointed him to the iron, which has since attracted so much attention, standing outside the shop-door. They said they found it covered with brains and dirt, and had washed it in the brook. The *appearance* of the iron corresponded with this story. It had a greasy appearance, and was so to the touch.

The patient was first seen seen by Dr Williams, the assistant of Dr Harlow, about twenty-five or thirty minutes after the accident. The patient was sitting on a chair upon the piazza of Mr Adams' Hotel, in Cavendish. Dr Williams first noticed the wound upon the head before he alighted from his carriage, the pulsations of the brain being very distinct; there was also an appearance which, before he examined the head, he could not account for. The top of the head appeared somewhat like an inverted funnel; this was owing, he discovered, to the bone being fractured about the opening for a distance of about two inches in every direction. The opening through the skull and integuments was not far from one and a half inch in diameter; the edges of this opening were everted, and the whole wound appeared as if some wedge-shaped body had passed from below upward. Mr Gage, during the time Dr Williams was examining this wound, was relating the manner in which he was injured to the bystanders; he talked so rationally, and was so willing to answer questions, that Dr W. directed his inquiries to him in preference to the men who were with him at the time of the accident, and who were standing about at this time. Mr G. then related to him some of the circumstanes, as he has since done; and he asserts that neither at that time nor on any subsequent occasion, save once, did he consider him to be other than perfectly rational. The one time, referred to, was about a fortnight after the accident, and then he persisted in calling Dr W., John Kirwin; yet he answered all his questions correctly.

Dr Williams did not believe Mr Gage's statement at that time, but thought he was deceived; Dr W. asked him where the bar entered, and he pointed to the wound on his cheek, which he had not before discovered; this was a slit running from the angle of the jaw forward about one inch and a half; it was very much stretched laterally, and was discoloured by powder and iron rust, or at least appeared so. Mr Gage persisted in saying that the bar went through his head: an Irishman standing by, said, "Sure it was so, Sir, for the bar is lying in the road below, all blood and brains." The man also said he would have brought it up with him, but he thought there would be an inquest, and it would not do.

About this time, Mr G. got up and vomited a large quantity of blood, together with some of his food; the effort of vomiting pressed out about half a teacupful of the brain, which fell upon the floor, together with the blood, which was forced out at the same time. The left eye appeared more dull and glassy than the right. Mr G. said he could merely distinguish light with it.

Soon after Dr Harlow arrived, Mr Gage walked up stairs, with little or no assistance, and laid down upon a bed, when Dr H. made a thorough examination of the wounds, passing the whole length of his forefinger into the superior opening without difficulty; and my impression is that he did the same with the inferior one, but of that I am not absolutely certain; after this we proceeded to dress the wounds in the manner described by Dr H. in the Journal. During the time occupied in dressing, Mr G. vomited two or three times fully as freely as before. All at this time Mr G. was perfectly conscious, answering all questions, and calling his friends by name as they came into the room.

Dr Harlow soon arrived, and with Dr Williams examined and dressed the wound.

From their appearance, the fragments of bone being uplifted and the brain protruding, it was evident that the fracture was occasioned by some force acting from below upward. The scalp was shaven, the coagula removed, together with three small triangular pieces of the cranium; and in searching to ascertain if there were other foreign bodies there, he passed in the index finger its whole length, without the least resistance, in the direction of the wound in the cheek, which received the other finger in like manner. A portion of the anterior superior angle of each parietal bone, and a semicircular piece of the frontal bone, were fractured, leaving a circular opening of about three and a half inches in diameter. This examination, and the appearance of the iron, which was found some rods distant, smeared with brain, together with the testimony of the workmen, and of the patient himself, who was still sufficiently conscious to say that "the iron struck his head and passed through," was considered at the time sufficiently conclusive to show not only the nature of the accident, but the manner in which it occurred.

Dr Harlow did not probe the wound.

The spiculæ of bone having been taken away, a portion of the brain, which hung by a pedicle, was removed, the larger pieces of bone replaced, the lacerated scalp was brought together as nearly as possible, and retained by adhesive straps, excepting at the posterior angle, and over this a simple dressing—compress, nightcap, and roller. The wound in the face was left patulous, covered only by a simple dressing. The hands and forearms were both deeply burned nearly to the elbows, which were dressed, and the patient was left with the head elevated, and the attendants requested to keep him in that position.

10 P.M., same evening.—The dressings are saturated with blood, but the hemorrhage appears to be abating. Has vomited twice only since being dressed. Sensorial powers remain as yet unimpaired. Says he does not wish to see his friends, as he shall be at work in a day or two. Tells where they live, their names, &c. Pulse 65; constant agitation of the lower extremities

14th, 7 A.M.—Has slept some; appears to be in pain; speaks with difficulty; tumefaction of face considerable, and increasing; pulse 70; knows his friends and is rational. Asks who is foreman in his pit. Hemorrhage internally continues slightly. Has not vomited since 12 P.M.

15th, 9 A.M.—Has slept well half the night. Sees objects indistinctly with the left eye, when the lids are separated. Hemorrhage has ceased. Pulse 75. 8 P.M., Restless and delirious; talks much, but disconnected and incoherent. Pulse 84, and full. Prescribed half a fluid drachm of colchicum wine, every six hours, until it purges him. Removed the nightcap.

16th, 8 A.M.—Patient appears more quiet. Pulse 70. Dressed the wounds, which in the head have a fetid sero-purulent discharge, with particles of brain intermingled. No discharge from bowels. Ordered one ounce of sulphate of magnesia, repeated every hour until it operates. Iced water to the head and eye. A fungus appears at the external canthus of the left eye. Says "the left side of his head is banked up."

17th, 8 A.M.—Pulse 84. Purged freely. Rational, and knows his friends. Discharge from the brain profuse, very fetid and sanious. Wounds in face healing.

18th, 9 A.M.—Slept well all night, and lies upon his right side. Pulse 72; tongue red and dry; breath fetid. Removed the dressings, and passed a probe to the base of the cranium, without giving pain. Ordered a cathartic, which operated freely. Cold to head. Patient says he shall recover. He is delirious, with lucid intervals.

19th, 8 P.M.—Has been very restless during the day; skin hot and dry; tongue red; excessive thirst; delirious, talking incoherently with himself, and directing his men.

20th and *21st*.—Has remained much the same.

22d, 8 A.M.—Patient has had a very restless night. Throws his hands and feet about, and trys to get out of bed. Head hot. Says "he shall not live long so." Ordered a cathartic of calomel and rhubarb, to be followed by castor oil, if it does not operate in six hours. 4 P.M. Purged freely twice, and inclines to sleep.

23d.—Rested well most of the night, and appears stronger and more rational. Pulse 80. Shaved the scalp a second time, and brought the edges of the wound in position, the previous edges having sloughed away. Discharge less in quantity and less fetid. Loss of vision of left eye.

From this time until the 3d of October, he lay in a semi-comatose state, seldom speaking unless spoken to, and then answering only in monosyllables. During this period, fungi started from the brain, and increased rapidly from the orbit. To these was applied nitrate of silver cryst., and cold to the head generally. The dressings were renewed three times in every twenty-four hours; and in addition to this, laxatives, combined with an occasional dose of calomel, constituted the treatment. The pulse varied from 70 to 96,—generally very soft. During this time an abscess formed under the frontalis muscle, which was opened on the 27th, and has been very difficult to heal. Discharged nearly eight ounces at the time it was punctured.

Oct. 5th and *6th*.—Patient improving. Discharge from the wound and sinus, laudable pus. Calls for his pants, and wishes to get out of bed, though he is unable to raise his head from the pillow.

7th.—Has succeeded in raising himself up, and took one step to his chair, and sat about five minutes.

11th.—Pulse 72. Intellectual faculties brightening. When I asked him how long since he was injured, he replied, "four weeks this afternoon, at half-past four o'clock." Relates the manner in which it occurred, and how he came to the house. He keeps the day of the week and time of day in his mind. Says he knows more than half of those who inquire after him. Does not estimate size or money accurately, though he has memory as perfect as ever. He would not take one thousand dollars for a few pebbles which he took from an ancient river bed where he was at work. The fungus is giving way under the use of the cryst. nitrate of silver. During all of this time there has been a discharge of pus into the fauces, a part of which passed into the stomach, the remainder being ejected from the mouth.

20th.—Improving. Gets out and into bed with but little assistance. Sits up thirty minutes twice in twenty-four hours. Is very childish; wishes to go home to Lebanon, N. H. The wound in the scalp is healing rapidly.

Nov. 8th.—Improving in every particular, and sits up most of the time during the day. Appetite good, though he is still kept upon a low diet. Pulse 65. Sleeps well, and says he has no pain in the head. Food digests easily, bowels regular, and nutrition is going on well. The sinus under the frontalis muscle has nearly healed. He walks up and down stairs, and about the house, into the piazza, and I am informed this evening that he has been in the street to-day.—I leave him for a week with strict injunctions to avoid excitement and exposure.

15th.—I learn, on inquiry, that Gage has been in the street every day except Sunday, during my absence. His desire to be out and to go home to Lebanon has been uncontrollable by his friends, and he has been making arrangements to that effect. Yesterday he walked half a mile, and purchased some small articles at the store. The atmosphere was cold and damp, the ground wet, and he went without an overcoat, and with thin boots. He got wet feet and a chill. I find him in bed, depressed and very irritable. Hot and dry skin; thirst; tongue coated; pulse 110; lancinating pain in left side of head and face; rigors, and bowels constipated. Ordered cold to the head and face, and a black dose to be repeated in six hours, if it does not operate. He has had spiculæ of bone pass into the fauces, which he expelled from the mouth within a few days.

16th, A.M.—No better. Cathartic has operated freely. Pulse 120; skin hot and dry; thirst and pain remain the same. Has been very restless during the night. Venesection, sixteen fluid ounces. Ordered ten grains of calomel and two grains of ipecacuan, followed in four hours by castor oil.

8 P.M., same day.—Purged freely; pulse less frequent; pain in head moderated; skin moist. Three grains of antimony and tartrate of potass, and six fluid ounces of simple syrup. Dose, a dessertspoonful every four hours.

17th.—Improving. Expresses himself as "feeling better in every respect;" has no pain in the head.

18th.—Is walking about the house again: says he feels no pain in the head, and appears to be in a way of recovering if he can be controlled.

Remarks.—The leading feature of this case is its improbability. A physician who holds in his hand a crowbar, three feet and a half long, and more than thirteen pounds in weight, will not readily believe that it has been driven with a crash through the brain of a man who is still able to walk off, talking with composure and equanimity of the hole in his head. This is the sort of accident that happens in the pantomime at the theatre, but not elsewhere. Yet there is every reason for supposing it in this case literally true. Being at first wholly sceptical, I have been personally convinced; and this has been the experience of many medical gentlemen who, having first heard of the circumstances, have had a subsequent opportunity to examine the evidence.

This evidence is comprised in the testimony of individuals, and in the anatomical and physiological character of the lesion itself.

The above accounts from different individuals, concur in assigning to the accident a common cause. They are selected as the most complete among about a dozen of similar documents forwarded to me by Dr Harlow, who was kind enough to procure them at my request; and which bear the signature of many respectable persons in and about the town of Cavendish, and all corroborative of the circumstances as here detailed The accident occurred in open day, in a quarry in which a considerable number of men were at work, many of whom were witnesses of it, and all of whom were attracted by it. Suffice it to say, that in a thickly populated country neighbourhood, to which all the facts were matter of daily discussion at the time of their occurrence, there is no difference of belief, nor has there been at any time doubt that the iron was actually driven through the brain. A considerable number of medical gentlemen also visited the case at various times to satisfy their incredulity.

Assuming the point that the wound was the result of a missile projected from below upwards, it may be asked whether the wound might not have been made by a stone, while the bar was at the same moment thrown into the air. It may be replied in answer, that the rock was not split, nor, as far as could be learned, disintegrated. Besides, an angular bit of stone would have been likely to have produced quite as much laceration as the bar of iron, and it is in fact possible that the tapering point of the latter divided and repelled the soft parts, especially the brain, in a way that enabled the smooth surface of the iron to glide through with less injury. And assuming the only possible hypothesis, that the round bar followed exactly the direction of its axis, the missile may be considered as a sphere of one and a quarter inches diameter, preceded by a conical and polished wedge.

The patient visited Boston in January 1850, and remained some time under my observation, during which he was presented at a meeting of the Boston Society for Medical Improvement, and also to the medical class at the hospital. His head, now perfectly healed, exhibits the following appearances.

A linear cicatrix of an inch in length occupies the left ramus of the jaw near its angle. A little thickening of the soft tissues is discovered about the corresponding malar bone. The eyelid of this side is shut, and the patient unable to open it. The eye considerably more prominent than the other, offers a singular confirmation of the points illustrated by the prepared skull described below. It will be there seen that the parts of the orbit necessarily cut away are those occupied by the *levator palpebræ superioris*, the *levator oculi*, and the abducens muscles. In addition to a ptosis of the lid, the eye is found to be incapable of executing either the outward or upward motion; while the other muscles animated by the *motor communis* are unimpaired. Upon the head, and covered by hair, is a large unequal depression and elevation. A portrait of the cast of the shaved head is given in a plate; and it will be there seen that a piece of cranium of about the size of the palm of the hand, its posterior border lying near the coronal suture, its anterior edge low upon the forehead, was raised upon the latter as a hinge to allow the egress of the bar; and that it still remains raised and prominent. Behind it is an irregular and deep sulcus several inches in length, beneath which the pulsations of the brain can be perceived.

In order to ascertain how far it might be possible for this bar of an inch and a quarter diameter to traverse the skull in the track assigned to it, Dr Bigelow procured a common skull, in which the zygomatic arches are barely visible from above, and having entered a drill near the left angle of the lower jaw, passed it obliquely upwards to the median line of the cranium just in front of the junction of the sagittal and coronal sutures.

This aperture was then enlarged until it allowed the passage of the bar in question, and the loss of substance strikingly corresponds with the lesion said to have been received by the patient. From the coronoid process of the lower jaw is removed a fragment measuring about three-quarters of an inch in length. This fragment in the patient's case might have been fractured, and subsequently reunited.

The hole now enters obliquely beneath the zygomatic arch, encroaching equally upon all its walls. In fact, it entirely occupies this cavity; the posterior wall of the antrum being partially excavated at the front of the hole, the whole orbitar portion of the sphenoid bone being removed behind, as also the anterior part of the squamous portion of the temporal bone, and the internal surface of the zygoma and malar bone laterally. In the orbit, the sphenoid bone, part of the superior maxillary below, and a large part of the frontal above, are cut away, and with these fragments much of the spheno-maxillary fissure, leaving, however, the optic foramen intact about a quarter of an inch to the inside of the track of the bar.

The base of the skull upon the inside of the cranium presents a cylindrical hole of an inch and a quarter diameter, and such as may be described by a pair of compasses, one leg of which is placed upon the lesser wing of the sphenoid bone at an eighth of an inch from its extermity, cutting the frontal, temporal, and sphenoid bones; the other, half an inch outside the internal optic foramen.

The calvarium is traversed by a hole, two-thirds of which is upon the left, and one-third upon the right of the median line, its posterior border being quite near the coronal suture. The iron freely traverses the oblique hole thus described.

It is obvious that a considerable portion of the brain must have been carried away; that, while a portion of its lateral substance may have remained intact, the whole central part of the left anterior lobe, and the front of the sphenoidal or middle lobe, must have been lacerated and destroyed. This loss of substance would also lay open the anterior extremity of the left lateral ventricle; and the iron, in emerging from above, must have largely impinged upon the right cerebral lobe, lacerating the falx and the longitudinal sinus. Yet the optic nerve remained unbroken in the narrow interval between the iron and the inner wall of the orbit. The eye, forcibly thrust forward at the moment of the passage, might have again receded into its socket, from which it was again somewhat protruded during the subsequent inflammation.

It is fair to suppose that the polished conical extremity of the iron which first entered the cavity of the cranium prepared the passage for the thick cylindrical bar which followed; and that the point, in reaching and largely breaking open the vault of the cranium, afforded an ample egress for the cerebral substance, thus preventing compression of the remainder.

Yet is difficult to admit that the aperture could have been thus violently forced through without a certain comminution of the base of the cranium driven inwards upon the cerebral cavity.

Little need be said of the physiological possibility of this history. It is well known that a considerable portion of the brain has been in some cases abstracted without impairing its functions. Atrophy of an entire cerebral hemisphere has also been recorded.

But the remarkable features of the present case lie not only in the loss of cerebral substance, but also in the singular chance which exempted the brain from either concussion or compression, which guided the enormous missile exactly in the direction of its axis, and which averted the dangers of subsequent inflammation. An entire lung is often disabled by disease; but Dr Bigelow expresses the belief, that there is no parallel to the case in the Hunterian collection of a lung and thorax violently transfixed by the shaft of a carriage, as in the case recorded by Mr Maiden.

Taking all the circumstances into consideration, it may be doubted whether the present is not the most remarkable history of injury to the brain which has been recorded.

IV. MISCELLANEOUS.

The Mineral Waters of Kissingen, and their Therapeutic Applications. From Dr BALLING and others.

Kissingen is situate on the banks of the river Saal, in the province of Lower Franconia, now forming part of the kingdom of Bavaria. The valley of the Saal is one of the most beautiful and picturesque in Germany. The town of Kissingen is situate about the middle of Germany, at about equal distances from Wurtzburg, Meiningen, Fulda, and Bamerg. The scenery around the town is varied. The valley is bounded y hills, the base of which is covered with vines, and the summits with rest trees, clothed in the most luxuriant foliage. The climate is represented to be mild and temperate, being sheltered from the north and the ast. The atmosphere is pure and dry.

At Kissingen are five mineral springs, which have been for many ears employed as remedial agents, with, it is said, satisfactory results. hese springs are,—

1. The *Ragozzi*, or *Ragoczi*, discovered in the year 1777, in the anient bed of the river Saal.
2. The *Pandur*, known for many centuries; used principally for athing.
3. The *Soolensprudel*, discovered in 1822.
4. The *Maxbrunnen*, probably the longest in use, and taken only internally.
5. The *Teresienquelle*, the age of which is dated from 1828.

Four of these, the Ragozzi, the Pandur, the Maxbrunnen, and the Teresienquelle, belong to the class of cold springs, their temperature not exceeding 8 or 9 degrees of Reaumur, or 45·75 to 50 degrees of Fahrenheit. The Soolensprudel approaches in temperature the class of thermal waters, being 15½ Reaumur, or 68·69 Fahrenheit. The quantity of water furnished by these springs in a given time is considerable, amounting, in the instance of the Ragozzi, the Pandur, and the Soolensprudel, to not less than forty cubic feet in one minute.

The Soolensprudel presents the phenomenon of ebbing and flowing at stated intervals, yielding in its ebullition an immense quantity of carbonic acid gas, which, according to Dr Balling, seems to be the power by which the water is propelled upwards. Some illustration of this may be afterwards mentioned.

It may be observed, that in the whole five sources carbonic acid is found in considerable amount;—in the Ragozzi at the rate of 26¼ cubic inches in 16 ounces of water; in the Pandur at the rate of 28·85 cubic inches in 16 ounces; in the Maxbrunnen at the rate of 31 cubic inches in 16 ounces; in the Theresienbrunnen at the rate of 28·35 cubic inches in 16 ounces; and in the Soolensprudel at the rate of 30½ cubic inches in 16 ounces.

The Springs of Kissingen were subjected to complete analysis by Kastner. Though they contain many ingredients, yet the predominant and most abundant salt is hydrochlorate of soda, or common salt, which is found most abundantly in the Ragozzi (62 grains in 16 ounces), Pandur (57 grains), and Soolensprudel (107½ grains in 16 ounces), and less copiously in the Maxbrunnen and Theresienbrunnen (18 grains in 16 ounces).

The substance next abundant is hydrochlorate of magnesia, of which 6·85 grains are found in 16 ounces of the Ragozzi, and 24½ in the Soolensprudel. The Pandur spring contains only 5·8 grains, the Maxbrunnen 3, and the Theresienbrunnen 2¾ grains of hydrochlorate of magnesia in 16 ounces of water.

Next to these two salts, which may be regarded with carbonic acid as leading ingredients, come carbonate of lime, carbonate of magnesia (most likely a supercarbonate), sulphate of soda, and sulphate of lime, nearly in proportions indicated by the order now specified. Silica is found in the Ragozzi to the amount of 2¼ per cent., and in the Pandur to that of 1½ per cent. Iodine and bromine are also present,—the former in combination with soda, the latter with soda and magnesia,—but both in very minute quantities.

Iron is also present in all the springs, excepting the Theresienbrunnen; but the amount is under one grain in 16 ounces, unless in the instance of the Maxbrunnen, in which subcarbonate of iron occurs to the extent of 1·86 grain in 16 ounces. (This is according to the Table to Analysis. According to some statements the Maxbrunnen is void of iron.)

Arsenic has, since the analysis by Kastner, been found by Buchner in the water of the Ragozzi and the Pandur springs; and it is probable that it is associated with iron.

Of these springs, the Ragozzi is that generally employed for drinking. Its taste is saline, sometimes more pungent than at others, from variable quantities of carbonic acid gas, and after the first glass or two it is not unpalatable. On its effects almost all the writers speak with some degree of confusion and vagueness. It does not appear to act on the bowels at once. But during the first six or seven days of drinking it there is increased appetite, and activity in the functions of the alimentary canal, with what Dr Balling calls elasticity of spirits. During the second week some degree of reaction takes place; the patient becomes capricious and irritable, the tongue is furred, the appetite diminished, and the bowels are irregular, sometimes with uneasy sensations of distension.

The Pandur, it has been mentioned, is employed mostly for bathing.

The water of the Soolensprudel, which is most strongly charged with salt, has been long used for the purpose of obtaining salt, by evaporating the water. After the crystallization of the salt there is left in the reservoir a strong brine, which is called by the workmen MUTTER-LAUGE or Mother-Lee, and which is sometimes added to the water of the baths for the purpose of increasing their stimulating action on the skin and system at large.

This strong brine was analysed by Kastner, and is said to contain, in 1000 grains, the following proportions of salts.

	Grains.
Hydrochlorate of soda,	57
Hydrochlorate of potass,	20
Hydrochlorate of lithia,	4
Hydrochlorate of magnesia,	250
Sulphate of magnesia,	31
Hydrobromate of magnesia,	1
	363
Water,	635
	999

It is a circumstance deserving attention, that the hydrochlorate of magnesia is in this water much more abundant after evaporation than before.

During the last ten or twelve years, an important operation has been and is still in progress, with the Soolensprudel, and is now nearly completed, by means of which a most abundant supply of water is brought to the surface. This consists in an Artesian perforation, carried to the depth of 1878 feet, through all the strata, to the reservoir of salt and salt water.

The saline valley, in which Kissingen is situate, stands at an elevation of 650 feet above the level of the Baltic Sea. The stratification of its rocks, from the surface downwards, as revealed by successive borings, is the following. The boring instruments first went through 1240 feet of variegated sandstone; then through 350 feet of sandstone of the Vosges formation; next through 150 feet of magnesian limestone (Zechstein); and, lastly, through 138½ feet of rock salt; thus reaching a total depth of 1878½ feet.

In the latter, or rock salt stratum, which is presumed to be 1000 feet thick, a pure saline source (SOOLE) is formed by solution of the rock salt in water. This solution has been found to contain 27¼ per cent. of salt; and as it is not probable that the boring engineers will be able to penetrate into the rock beyond thirty feet further than they have gone, to that extent, it is stated, the perforation is to be carried, and the well completed by the end of 1850.

The depth, above-mentioned, of 1878½ feet, was attained on Monday the 12th day of August; and when the perforation was entirely cleared, the result was witnessed by many spectators, in a column of water, four inches in diameter, springing with prodigous force out of the earth to the height of fifty-eight feet, spreading out at its summit like a palm-tree, and forming one of the most magnificent *jets d'eau* ever beheld. The water rises perfectly clear at a temperature of 66 Fahrenheit, charged with 3¼ per cent. of pure salt, at the rate of 100 cubic feet in the minute.

The force with which the water is ejected to so great a height, is stated to be owing to a source or reservoir of almost pure carbonic acid gas, which having been met with at the depth of 1680 feet from the surface, at the junction of the gypsum and the zechstein, escaped with immense force through the Artesian bore-hole, propelling the incumbent water in a column into the air in the manner mentioned.

In the course of the boring operations, two distinct salt wells were gone through at the depth of 222 and 1250 feet respectively, and giving the respective temperatures of 50° and 66° Fahrenheit, and 1¼ and 2½ per cent. of salt. It was under both these wells, at the depth of 1680 feet that the great receptacle of carbonic acid gas was entered. It is supposed that this carbonic acid gas, whatever be its source, is spread equally and uniformly, under and throughout the strata of the valley, because all the mineral springs of Kissingen are more or less impregnated with the gas, which imparts to them the sparkling effervescent appearance and the pleasant pungent flavour by which these waters are distinguished.

The presence of the gas in so great quantity gave rise to extraordinary commotion in the bore-hole, and caused some impediment to the boring operations. This, however, was speedily obviated by the engineer, Inspector Joseph Knorr, who, by a simple contrivance, arrested completely the further escape of the gas at that time.

This method of bringing to the surface of the earth the briny water of the valley of Kissingen will furnish the means of obtaining salt much more abundantly than in the method hitherto in use, and at a cheaper rate. It is calculated, that when the whole work shall be completed, 3¾ cubic feet of briny water, free from iron and other impurities, will be conveyed to the boiling house every minute, at a temperature of 92° Fahrenheit, which it is understood is the temperature at the depth of 1900 feet. These 3¾ cubic feet of brine are further estimated to furnish 50 pounds of crystallized salt. It is proposed in the meantime to limit the whole annual produce of salt from this source to 6,000,000 (six millions) of pounds, which at the current market price will add to the revenue of the crown of Bavaria 300,000 florins, after deducting 60,000 florins for yearly expenses of work, fuel, and management.

This Artesian perforation was begun in the shaft of an old well, called the Schonbronn, in 1832, from which time, and during a period of eleven years, up to 1843, only 800 feet were bored through the rocks, the operations being often suspended and interrupted from the laborious and expensive nature of the undertaking. In 1843, Inspector Joseph Knorr having confidently predicted a successful result, the government were induced to resume operations on a systematic scale, and have since carried them on with perseverance by day and by night. The result is seen in the obtaining of a large and uninterrupted supply of briny water.

The whole expense of this Artesian work, from the commencement to the estimated completion of the work, including all the requisite pumps, pipes, and the pavilion to be erected over the works, will amount to 80,000 florins, about L.6666.

Dr Granville, from whom several of the particulars of the above account are taken, thinks that the propelling agent in the case of the Kissingen well is the subterranean atmosphere of carbonic acid gas, which acts, he states, with the force of sixty ordinary atmospheres. This may now add to the force with which the water is ejected through this long cylindrical chimney. But it must be remembered, that in all instances of Artesian wells of sufficient depth, that is, where the perforation is carried quite through the superficial strata, the water flows up with great force, and in a constant stream, without any agent of this kind impelling it.

A similar Artesian perforation has been completed, it is said, within the last two years, at Prussia Munden, in which the salt water is drawn up from a great depth, but rises only to the height of fifteen feet above the surface, and is strongly impregnated with salt.

In addition to the mineral springs, there are at Kissingen auxiliary means, which are employed to assist, modify, and augment the physiological and therapeutic effects of the waters, as the circumstances of the case or the state and form of the disease may indicate.

These are,—

1. The carbonic acid gas, yielded in such an excess of quantity by the Soolensprudel. This being collected by an apparatus adapted for the purpose, is applied in the form of a douche in cabinets erected for the accommodation of invalids close to the spring.

2. The steam issuing from the evaporating pans used in the salt works, which is employed not only for bathing, but is also inhaled in certain affections of the lungs.—A separate establishment of baths has lately been fitted up for this purpose.

3. An establishment for the making of whey either from goat's or cow's milk, given with good effect in combination with the Maxbrunnen.

4. The mud baths; and,

5. Baths composed of Mutterlauge (mother water) or strong brine, which remains in the reservoirs after the crystallization of the salt.

The effects of the Ragozzi, Pandur, and Soolensprudel are distinguished into primary and secondary. The latter alone are important.

They are to be observed as they evince their inaction in changes in the secretions; in the circulation and nervous system; and in producing what are called symptoms of reaction or crisis.

1. In the secretions.

a. The secretion of the mucous membranes.—It is chiefly at the commencement of the cure that the secretions of the mucous membranes of the alimentary canal and of the organs of respiration are increased.

The phlegm changes in colour, odour, and consistency, according to the nature of the disease or peculiarity of idiosyncrasy in the individual. Thus, gluey tough matter of a dark green colour, or pale frothy matter, is frequently ejected, while, on the other hand, matter of a grey black or dark brown colour, and looking like the spawn of frogs, passes off by the rectum. The discharge from the sexual organs has a thin watery appearance, and a peculiarly pungent smell.

b. Secretion of the skin.—The perspiration, which is greatly increased in quantity, has an acrid smell; in some cases its odour is specific and is characteristic of certain maladies, such as hemorrhoids and affections of the spleen. It not unfrequently produces an itching and burning sensation on the skin, which is followed by miliary eruption.

c. Secretions of the kidneys.—The secretion of the kidneys, as may be readily supposed from the quantity of carbonic acid gas, is greatly increased by the action of the waters.

The urine is often sedimentitious; sometimes the deposit is crystalline, but more frequently mucous; this, however, depends upon the action of the salts contained in the water upon substances met with in the bladder. Uric acid is sometimes deposited, and we not unfrequently detect the salts of ammonia. In affections of the liver, oleaginous and bilious matter are met with, and in some nervous disorders the urine emits a peculiarly pungent and disagreeable odour, which, however, generally ceases after a few days.

d. Secretion of the alimentary canal.—The secretion of the alimentary canal is increased from the commencement to the end of the course. In quality it varies according to the nature of the disease: sometimes watery, but more frequently the contrary, and almost always of a peculiarly unhealthy appearance and fetid odour.

e. Glandular secretions.—The secretion of the salivary glands is rarely increased, but its chemical character is frequently changed. The increased secretion of the liver is very perceptible; bilious matter is often ejected by the mouth, or, mixed with a quantity of mucus, it passes off by the bowels.

f. Respiration is affected.—The breathing being not only quickened, but the exhalation is, if the expression may be used, more voluminous. The breath itself has a peculiar sickly smell, so that by this sign, certain diseases may be detected.

2. Changes in the circulation and nervous system.

Should the blood at the commencement of the treatment be black in colour and thick in consistency,—should the circulation be torpid or unequal, the veins swollen, extended, or varicose, indicating that the whole circulating system is in an abnormal state, the waters of the Ragozzi will be found after a certain time to exert a most salutary influence. The blood will become more fluid and assume its original colour, the circulation will be quickened and the pulsation regulated, the veins will be reduced to their normal diameter, and at the end of four or six weeks the balance between the arterial and venous systems will be re-established;—at the same time the symptoms which are usually present in such cases, and which generally consist in extreme nervous irritability or depression, gradually disappear. This beneficial effect, however, does not usually take place without considerable constitutional derangement.

A painful depression of spirits, amounting almost to hopelessness and despair, accompanied by great irritability of temper, are the symptoms which usually indicate the gradual and salutary effects of the waters; these symptoms continue for several days, but rarely without interruption; they subside by degrees, and are followed by renewed vigour both of body and mind.

When the albuminous and watery particles in the blood predominate, or when the fluid has a transparent lymphatic appearance, the internal use of the Ragozzi, pursued simultaneously with the baths of the Soolensprudel, will be found to exert a most beneficial influence; the lymph will become purified and free from all foreign matter. Should a tendency to swelling in the glands exist, it will be found to decrease, and the proper proportions between the component parts of the blood will be gradually restored. Both these results are easily accounted for when we consider the well-known effect of the water in purifying the blood and freeing it from all morbid matter,—thus effecting a complete change in the process of assimilation.

The effect of the waters of Kissingen upon the nervous system is not so easily explained. That it is equally powerful, however, cannot be doubted, since we perceive that the functions gradually regain their normal condition,—that depression of spirits disappear, and that the mind becomes both vigorous and energetic.

3. Indications of reaction or crisis.

Symptoms of fever ensue after the use of the waters has been continued for some time; these vary according to constitutional peculiarity or the nature of the disorder; the pulse too becomes more rapid, the temperature of the body is increased, the nervous system becomes irritated and excited, and physical, as well as moral, inactivity is the result.

Another effect which clearly proves the powerful action of these waters is, that symptoms in chronic complaints vary in their character and intensity,—frequently to such a degree as to adopt the character of acute disease. Hence—*a*. The remarkable phenomenon in cases where a combination of diseases exists in the same individual. Each will assume a different character,—the symptoms will become distinct, and each proceed independently of the other. Thus it is found, in obscure and complicated maladies, after the waters have been employed for two or three weeks, that the symptoms which at the commencement excited anxiety, are relieved by the appearance of another and separate disease of a more simple character, such as hemorrhoids, gout, rheumatism, eruptions, &c.

b. When a disease thus displays its characteristic symptoms, its course becomes simple and natural, and terminates favourably to the great relief of the patient. At times the symptoms produced by the action of the waters bears some relation to, or are characteristic of, the primary disease. Thus, for instance, in hemorrhoidal affections, furunculi or boils are produced, while rheumatic pains are relieved by a miliary eruption.

c. These symptoms, if not checked, pursue an uniform course even during the crisis, but are generally unattended by constitutional excitement. The crisis in scrofulous affections is often indicated by proper secretion of mucus, by an excess of oxalic acid in the urine, but more frequently by the appearance of exanthemata or eruptive diseases; in rheumatism by profuse perspiration, miliary fever, sedimentitious urine, &c., while in erysipelatous affections (rothlaufprocesse) we find bilious evacuations, high coloured urine, urticaria or nettle rash, &c.; this latter, however, continues for a few days only. In hemorrhoids the crisis is marked by an admixture of blood in the alvine excretions; in females this usually passes off *per vaginam*. Eruptions are seldom present. The sanative action of the water in gout manifests itself by the accession of a slight paroxysm, which, continuing for a few days, subsides gradually; slight fever is sometimes present; and towards the close of the attack the perspiration becomes profuse, and the action of the kidneys is greatly increased. The crisis in hysteria and hypochondriasis consists in the first instance in cramp, which is usually succeeded by quiet and refreshing sleep. The crisis once over, the patient will speedily recover, unless his malady has taken *too deep a root in the constitution*. When this is the case, when the energy of the reactive power has become too much weakened, we not unfrequently find a periodical return of cutical secretions; these are attended by the most beneficial results, since they afford time to the reactive powers of nature to recruit, which is followed by the gradual return of health and vigour. When, however, a complete prostration of the reactive organs exists, when the disorder has been so long continued that it has become habitual with the patient, no benefit can be expected. This is sometimes the case in hemorrhoidal and arthritic complaints. In such instances a crisis will also take place, and a periodical return may be expected; but it will not be so decisive in its nature as completely to overcome the disease. The patient's sufferings will not be removed; they may be alleviated. The secretions which are characteristic of a crisis, and which frequently follow a course of the waters, are the result of their subsequent action, and are partly produced by the renewed vigour acquired during the cure by the reactive powers of the constitution.

e. One peculiarly striking effect of the chalybeate saline waters of Kissingen, when taken in disease, is, that the malady of the sufferer retrogrades and passes *de novo* through the various symptoms by which it advanced, until it attained the exact stage at which the use of the water was commenced.

Another characteristic effect of these waters ought also to be noticed here. This is their peculiar action on the cause of *disorder or seat of disease.* This action continues as long as the morbific cause exists; but when once removed, all the secretions will become healthy and natural, and continue so even should the use of the remedy be persevered in for an undue space of time. This stage is called the *point of satiety* ("Sättigungspunkt.")

Dr Balling lays it down as a principle, that mineral waters, like those of Carlsbad, Marienbad, and several others, are chiefly efficacious in affections of the lower bowels, caused by accumulation of morbid matter; and that, on the other hand, waters containing iron have beneficial effect in cases in which a morbid condition of the nervous system is a primary, and that of the circulation is only a secondary, cause of diseases. Between these two orders of mineral waters he places the chalybeate saline springs of Kissingen; and enunciates on this subject the following aphorism.

The proper sphere of action of the waters of Kissingen is when the circulation and nervous system are simultaneously in a disordered condition, when accumulation of morbid matter exists in the lower bowels, accompanied by distension in some portions of the intestinal canal:—but their sanative efficacy in an impaired state of the digestive organs is the most striking. In all affections of this nature, the remedial efficacy of the Ragozzi remains unequalled.

It is added, that when a stimulating effect is indicated, as is often the case in induration of the liver, uterus, &c., the muriatic acid steam baths will be found a powerful accessory remedy; but when a vivifying action of the nervous system is required, the employment of the carbonic acid gas will be found to prove more efficient and successful.

The diseases in which the use of the waters of Kissingen are indicated are,—

a. Derangement of the functions of digestion in general.

b. Every species of scrofula, with the exception of that which has its seat in the texture of the lungs or brain.

The efficacy of these waters, however, in affections of this nature is chiefly apparent in scrofula of the mucous membranes, in enlargement of the glands, especially those of the abdomen, when they occur in the adult state. In all such cases the muriatic acid steam baths, and those composed of the waters of the Soolensprudel, are employed with most success.

c. In erysipelatous affections (Rothlaufprocess), whether they appear under the form of pure erysipelas, urticaria or angina, induration of the liver, or flour albus in females,—the Ragozzi and the Pandur, probably from their effect upon the abdominal circulation, will be found most successful.

d. Derangement (torpidity) in the abdominal circulation chiefly considered as a cause of hemorrhoids.

In all such cases, whether affecting the vessels of the brain, lungs, uterus, eyes, or any other organs, the waters of Kissingen have in no instance failed to afford permanent relief; and it may be said, that in these instances their peculiar efficacy is infallible.

e. Physicians speak not with the same confidence respecting their efficacy in gouty complaints; but they say that they generally destroy the root of the evil, and are useful to a very great extent in arthritic metastasis to internal organs, as well as in masked and atonic gout, especially the nervous forms of the disease, in which carbonic acid proves so successful, as well as in arthritic affections of the mucous membranes, particularly of the organs of generation and of the eyes.

f. Deranged state of the nervous system manifesting itself in the form of hypochondriasis and hysteria.

Here the benefit of the Kissingen waters is as great and as certain as in hemorrhoids. This is a second class of cases in which these waters, and especially the Ragozzi, may be regarded as having a specific efficacy.

g. General atony of the vessels and nerves supplying the abdomen, especially the organs of digestion with their appendages, and the organs of generation, whether it be caused by over excitement, or proceed from debilitating causes.

In affections of this nature, so frequently to be met with in the present artificial state of society, the Ragozzi, the baths of the Soolensprudel, abounding as they do in carbonic acid, and the gas baths, have been found of effectual and permanent benefit.

h. Rheumatic affections.

The peculiar efficacy of the waters of Kissingen in diseases of this class consists in this, that by the use of these waters, they are made to manifest themselves in the external muscular system and so can be benefited by the baths taken simultaneously with the internal use of the water. This is particularly to be observed in chronic rheumatic affections of the uterus, ovaria, pericardium, or rectum, masking themselves under the form of other diseases. A similar beneficial result may be expected in rheumatic neuralgia, whether having its seat in the abdominal or thoracic region.

i. In complaints of a catarrhal nature, especially those having their seat in the mucous membranes of the stomach, rectum, or urinary and sexual organs (the last particularly in the female sex), these waters are of decided efficacy.

k. Lastly, is to be mentioned the internal use of the Ragozzi simultaneously with the baths of the Pandur, as highly beneficial after recovery from low nervous gastric and similar fevers, in which the system has been greatly weakened and reduced. After the use of these waters for two or three weeks, the patient will find himself much strengthened, and often completely restored to his former health and vigour. The same remark applies to the after consequences of intermittent fever; only in such cases this remarkable circumstance will be observed, that when the disease has only been checked, but not completely cured, it will again manifest itself in a few paroxysms, after which it will entirely disappear.

The difference between the three mineral waters of which we are treating has been already in some degree specified. The first place among them belongs to the Ragozzi if we look to the proportion of iron this water contains as compared with its other ingredients. The importnce of this ingredient must not be underrated, for upon it depends the pplicability of the water to so large a range of diseases, and hence it an be used without injury by persons advanced in years, in whom a *olvent* and *evanescent* treatment is indicated, without at the same time reducing the strength. Next to the Ragozzi ranks the Pandur, which possesses in a still higher degree the power of the former as a solvent and promoter of the secretions, though not so strengthening, and consequently less powerful, in its action on the vascular and nervous systems. It agrees better with the female constitution, and is admirably fitted for an evening drink. In the Soolensprudel the saline ingredients greatly preponderate; hence its properties are for the most part solvent and aperient. It is very rich in carbonic acid, and contains just so much carbonate of iron as to counteract the debilitating effects which might otherwise follow a continued use of its saline ingredients. It is seldom taken alone, but more commonly in combination with the Pandur or the Ragozzi. These three mineral waters are also used for baths, the Ragozzi however but seldom: more commonly the Pandur and the Soolensprudel combined. The employment of the baths greatly assists the internal action of the waters.

When a course of chalybeate waters is indicated after Kissingen, those of Bocklet, which greatly resemble the Ragozzi, and are situated at the distance of a German mile only, may be safely recommended.

For the treatment of diseases of the chest, a particular modification of the Kissingen waters is considered most eligible. It is on the one hand thought, that, for disorders of this region of the body, the muriatic acid steam baths are beneficial, while iron, internally administered, is hurtful. For these reasons, the hydrochloric steam baths are recommended, and the internal use of the water of the Maxbrunnen, which contains no iron, is conceived to be the appropriate remedy. In its operation, it is said first to act upon the mucous membranes, exciting and invigorating their action, and promoting the process of assimilation; then, by means of its carbonic acid, it acts upon the skin and kidneys, increasing their secretions, while the evacuations from the bowels are but little augmented. Secondly, the natural secretion of all the mucous membranes, but especially that of the respiratory organs, is usually increased and altered in quality. Simultaneously with this, the secretion of bile becomes more active, and the skin and kidneys throw off any morbid matter which may be present in the body. Changes in the circulation gradually develop themselves; venous congestion decreases and disappears, and, in the same ratio, the arterial system regains its proper balance in the circulation.

The Maxbrunnen, totally devoid of iron, and in its saline contents coming short of the Ragozzi by nearly two-thirds, cannot be expected to produce the same extensive and manifest effects upon the system. The change produced by it in the secretions is less perceptible, the power of reaction is not so great, but it is of a surer and more lasting nature; hence febrile excitement in the use of this water is seldom produced, or at least demands little attention. It is not the character of this spring to call into action all the vital energies, or to produce any great or marked crisis.

These two remedies, with the use of whey, for which there is an establishment, are represented to be chiefly indicated under the following mentioned circumstances.

a. In persons in whom there is an abundant secretion from the mucous membrane of the lungs, and who are very subject to cold and inflammation of those organs.

b. Where there is a tendency to phthisis, especially in scrofulous constitutions, and where the disease begins to be developed about the age of puberty.

c. In chronic catarrhal affections of the respiratory tubes, but principally in *peripneumonia notha*, whatever be their causes, when tubercles are not present, or if present, merely in a latent state. We have not as yet, however, had sufficient experience to judge whether or not the inhalation of the vapour of muriatic acid persevered in for some time has a beneficial effect in tubercles of the lungs.

d. In great nervous irritability of the organs of respiration, such as we find in neuralgic and asthmatic affections of those organs.

In the above diseases, when we wish to produce a stimulating effect upon the mucous membrane, the Maxbrunnen, either alone or mixed with a small quantity of whey, is indicated. But in cases where there exists a high degree of irritability, or there is reason to fear that inflammation may occur, also where spitting of blood is present, a larger quantity of whey must be mixed with the water to diminish the stimulating effects of the carbonic acid and muriate of soda. The application of the muriatic acid steam, in consequence of its general influence in increasing and bringing into harmony all the secretions, is especially to be recommended in torpidity of the mucous membranes. In such cases, the use of this powerfully stimulating remedy has been attended with the most happy results.

Persons labouring under affections of the chest should also be aware that the inhalation of the atmosphere around the evaporating pans at Kissingen will be found most beneficial in the maladies with which they are afflicted.

The account now given will be sufficient to convey some idea of the therapeutic powers of the mineral waters of Kissingen. During the last ten or twelve years, they have been acquiring considerable celebrity, not only in Germany and France, but in some measure in this country. Accounts of the uses of these waters, and the states in which they are most likely to be beneficial, have been given by Dr Maas, Dr Balling, Dr Welsch, who are resident at the place, and by Dr Wendt of Breslau, Dr Eisenmann, and one or two others. All these writers are rather indiscriminate in their recommendations, and seem to proceed on the principle that there are few diseases for which the Kissingen waters are not good, either in the way of alleviation or cure. In the preceding account we have studied to avoid this error, and probably we have not perfectly succeeded. It is our belief, indeed, that the medical history of these waters requires yet to be written. At the same time, we may recommend the work by Dr Balling, *Kissingen et ses Eaux Mineraux*, from which many of the facts in this article are derived.

Medical Graduations at Edinburgh.—The Senatus Academicus of the University of Edinburgh conferred the degree of Doctor of Medicine on the following gentlemen, in number sixty-seven, after having gone through the appointed examinations, and defended publicly their Inaugural Dissertations.

FROM SCOTLAND.

John Angus, on Disordered Menstruation.
Hugh Melville Balfour, on Pulmonary Consumption.
John Bell, on Amenorrhœa.
Jn. Boyd, on Acute Hydrocephalus.
George Burn, on Alcohol.
Angus Cameron, on the Influence of Climate on the Human Race.
James Capie, on Disturbed Balance of the Circulation.
Al. Christison, on Cannabis Indica.
Robert Orr Crichton, on the Degeneration of the Solids and Fluids of the Body.

William Frederick Blyth Dalzel, on the Physiology of the Venous Circulation.
John Foulerton, on Phthisis Pulmonalis.
James Gilchrist, on the Influence of Clothing upon Health.
George Harley, on Oleum Jecoris Aselli.
James Hutchinson, on the Evidences of Pregnancy obtained by the Microscope and Stethoscope.
Angus M'Gregor, on the Operation of Moral and Physical Influences through Parents on their Offspring.
Laurence Mackenzie, on Bright's Disease of the Kidney.
Robert Cs. M'Watt, on the Urine.
Ebenezer Milner, on Catalepsy.
Donald Munro, on Rheumatism.
Archibald Wm. Pulteney Pinkerton, on the Various Modes of Fatal Termination of Diseases.
Alexander Robertson, Observations on the Purulent Ophthalmia of Infants, and the Scrofulous Ophthalmia.
David Rogerson, on Tubercle.
Alexander Schultze, on the Connection between Apoplexy and Disease of the Heart.
Alexander Struthers, on Premature Labour and Accidental Hemorrhage.
Dalhousie Tait, on the Pathology and Surgical Treatment of Aneurism.
Charles Thomson, on Bright's Disease of the Kidneys.
George S. Thomson, on Rheumatism
William Trail, on Dyspepsia.
Edmund Sydney Wason, on Stricture of the Urethra.
Wm. A. White, on Acute Laryngitis.
James Wilkin, on Stricture of the Urethra.

FROM ENGLAND.

Fergus Armstrong, on Croup.
Charles Booth, on the Therapeutic Action of Hydrocyanic Acid.
John Pince Challacombe, on Epidemic Cholera.
Henry Crocker, on Pericarditis.
Abraham Duke, on Tubercle.
William Falshaw, on Diseases of the Heart.
Francis James Ferguson, on the Morbid Appearances in the Bodies of the Insane.
James Hartley, on Gout.
Cs. Harwood, on Continued Fever.
William Marshall Holmes, on Intermittent Fever.
John Johnson, on Aneurism.
George Anthony Kirsopp Lake, on Arsenic, considered as a Poison.
John Lord, on the Fasciæ of the Female Pelvis.
Edmund Henry Peters, on Phthisis Pulmonalis.
Jn. Rolston, on Malignant Cholera.
Thomas Smith Rowe, on the Intermingled Relations of Mind and Body.
William Smith Scholefield, on Combination as an Instrument of Progress and Verification in Medical Science.
Francis Cornelius Webb, on the General Anatomy, Physiology, and Development of the Arterial System.
Nathaniel Stenson Wood, on the Spontaneous Evolution of the Fœtus in Utero.
Robert Checkley, on Scleroma.
James Christie, on Erysipelas.

IRELAND.

Thomas Seward Holland, on the Pathology and Diagnosis of Aneurism of the Arch of the Aorta and Arteria Innominata.
James Long, on Ulcers.
Samuel Snowdown, on Phlebitis.
James Young, on the Predisposing Causes of Diseases.

ISLE OF MAN.

Andrew Spittal, on Delirium Tremens.
Thomas Freer, on Variola.

FROM NEW BRUNSWICK.

Fenwick Williams Arnold, on the Surgical Treatment of Obstructions of the Mucous Passage.

FROM CANADA.

Norman Bethune, on Spina Bifida.

NOVA SCOTIA.

Lewis Johnston, on Exanthemata.

ST LUCIA.

William Macfarlane, on the Plague.
James Macfarlane, on Fever.

EAST INDIES.

James Grafton Carstairs, on Vegetable Embryology, or the Act of Impregnation in Plants.

Robert Wallace James, on Uterine Hæmorrhage.

Henry Nelson, on the Development of Entozoa.

FROM GENEVA.

William Marcet, on Fermentation.

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No. 186 *will be Published on the* 1*st of January* 1851.

ROBERT INCHES, PRINTER, OLD ASSEMBLY CLOSE, EDINBURGH.

JUN 1969

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